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LED TV

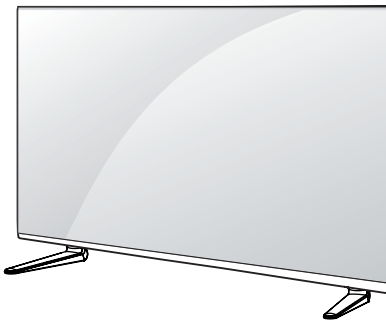
SERVICE MANUAL

CHASSIS : LD34N

MODEL: 55LA965V/W/9 55LA965V/W/9-ZA

CAUTION

BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by \triangle in the Schematic Diagram and Exploded View.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 M Ω and 5.2 M Ω .

When the exposed metal has no return path to the chassis the reading must be infinite.

An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.

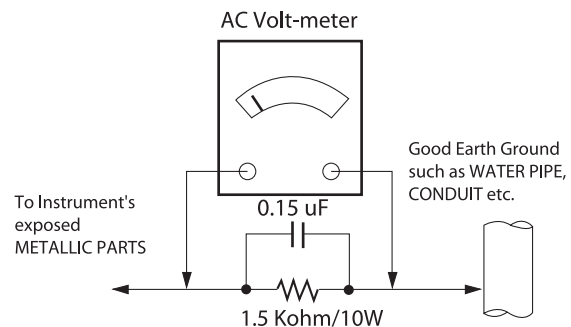
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 μ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.

Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which corresponds to 0.5 mA.

In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω

*Base on Adjustment standard

SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the **SAFETY PRECAUTIONS** on page 3 of this publication.

NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;

- Removing or reinstalling any component, circuit board module or any other receiver assembly.
- Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
- Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.

CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

- Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
- Do not spray chemicals on or near this receiver or any of its assemblies.
- Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
CAUTION: This is a flammable mixture.
Unless specified otherwise in this service manual, lubrication of contacts is not required.
- Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
- Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
- Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
Always remove the test receiver ground lead last.
- Use with this receiver only the test fixtures specified in this service manual.

CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

- Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.

- After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
- Use only a grounded-tip soldering iron to solder or unsolder ES devices.
- Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
- Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
- Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
- Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
- Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

- Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range of 500 °F to 600 °F.
- Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
- Keep the soldering iron tip clean and well tinned.
- Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
- Use the following unsoldering technique
 - Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
 - Heat the component lead until the solder melts.
 - Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
- Use the following soldering technique.
 - Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
 - First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
 - Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
 - Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

IC Remove/Replacement

Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor

Removal/Replacement

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device

Removal/Replacement

1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor

Removal/Replacement

1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.

3. Solder the connections.

CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections

To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. Carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections

Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side. Carefully crimp and solder the connections.

CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This specification is applied to the LED TV used LD34N chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

- 1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
- 2) Relative Humidity: 65 % ± 10 %
- 3) Power Voltage
 - : Standard input voltage (AC 100-240 V~, 50/60 Hz)
 - * Standard Voltage of each products is marked by models.
- 4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
- 5) The receiver must be operated for about 20 minutes prior to the adjustment.

3. Test method

- 1) Performance: LGE TV test method followed
- 2) Demanded other specification
 - Safety : CE, IEC specification
 - EMC : CE, IEC
 - Wireless : Wireless HD Specification (Option)

4. Model General Specification

No.	Item	Specification	Remarks
1	Market	EU(PAL Market-36Countries)/CIS + Morocco(Africa)	<p>DTV & Analog (Total 37 countries)</p> <p>DTV (MPEG2/4, DVB-T) : 30 countries Germany, Netherland, Switzerland, Hungary, Austria, Slovenia, Bulgaria, France, Spain, Italy, Belgium, Russia, Luxemburg, Greece, Czech, Croatia, Turkey, Moroco, Ireland, Latvia, Estonia, Lithuania, Poland, Portugal, Romania, Albania, Bosnia, Serbia, Slovakia, Beralus</p> <p>DTV (MPEG2/4, DVB-T2) : 8 countries UK(Ireland), Sweden, Denmark, Finland, Norway, Ukraine, Kazakhstan, Russia</p> <p>DTV (MPEG2/4, DVB-C) : 37 countries Germany, Netherland, Switzerland, Hungary, Austria, Slovenia, Bulgaria, France, Spain, Italy, Belgium, Russia, Luxemburg, Greece, Czech, Croatia, Turkey, Moroco, Ireland, Latvia, Estonia, Lithuania, Poland, Portugal, Romania, Albania, Bosnia, Serbia, Slovakia, Beralus, UK, Sweden, Denmark, Finland, Norway, Ukraine, Kazakhstan</p> <p>DTV (MPEG2/4, DVB-S/S2) : 30 countries Germany, Netherland, Switzerland, Hungary, Austria, Slovenia, Bulgaria, France, Spain, Italy, Belgium, Russia, Luxemburg, Greece, Czech, Croatia, Turkey, Moroco, Ireland, Latvia, Estonia, Lithuania, Poland, Portugal, Romania, Albania, Bosnia, Serbia, Slovakia, Beralus, UK, Sweden, Denmark, Finland, Norway, Ukraine, Kazakhstan</p> <p>Supported satellite : 29 satellites ABS1 75.0E/ AMOS 4.0W/ ASIATSATS 105.5E/ ASTRA1LHMKR 19.2E/ ASTRA2ABD 28.2E/ ASTRA3AB 23.5E/ ASTRA4A 4.8E/ ATLANTICBIRD2 8.0W/ ATLANTICBIRD3 5.0W/ BADR 26.0E/ EURO-BIRD3 33.0E/ EURO-BIRD9A 9.0E/ EUTELSATW2A 10.E/ EUTELSATW3A 7.0E/ EUTELSATW4W7 36.0E/ EUTELSESAT 16.0E/ EXPRESSAM1 40.0E/ EXPRESAM3 140.0E/ EXPRESSAM33 96.5E/ HELLASAT2 39.0E/ HISPASAT1CDE 30.0W/ HOTBIRD 13.0E/ INTELSAT10&7 68.5E/ INTELSAT15 85.2E/ INTELSAT904 60.0E/ NILESAT 7.0W/ THOR 0.8W/ TURKSAT 42.0E/ YAMAL201 90.0E</p>

No.	Item	Specification	Remarks
2	Broadcasting system	1) PAL-BG/DK/I/I' 2) SECAM L/L', DK, BG, I 3) DVB-T/T2, C, S/S2	
3	Program coverage	1) Digital TV - VHF, UHF - C-Band, Ku-Band 2) Analogue TV -VHF : E2 to E12 -UHF : E21 to E69 -CATV : S1 to S20 -HYPER : S21 to S47	
4	Receiving system	Analog : Upper Heterodyne Digital : COFDM, QAM	<p>► DVB-T</p> <ul style="list-style-type: none"> - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32 - Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 <p>► DVB-T2</p> <ul style="list-style-type: none"> - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256, - Modulation : Code Rate QPSK : 1/2, 2/5, 2/3, 3/4, 5/6 16-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 64-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 256-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 <p>► DVB-C</p> <ul style="list-style-type: none"> - Symbolrate : 4.0Msymbols/s to 7.2 Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM <p>► DVB-S/S2</p> <ul style="list-style-type: none"> - symbolrate : DVB-S2 (8PSK / QPSK) : 2 ~ 45 Msymbol/s DVB-S (QPSK) : 2 ~ 45 Msymbol/s - viterbi DVB-S mode : 1/2, 2/3, 3/4, 5/6, 7/8 DVB-S2 mode : 1/2, 2/3, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10
5	Input Voltage	AC 100 ~ 240 V, 50/60 Hz	

5. External input format

5.1. 2D Mode

(1) Component input(Y, CB/PB, CR/PR)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	
1.	720×480	15.73	60.00	SDTV, DVD 480i
2.	720×480	15.63	59.94	SDTV, DVD 480i
3.	720×480	31.47	59.94	480p
4.	720×480	31.50	60.00	480p
5.	720×576	15.625	50.00	SDTV 576i
6.	720×576	31.25	50.00	SDTV 576p
7.	1280×720	45.00	50.00	HDTV 720p
8.	1280×720	44.96	59.94	HDTV 720p
9.	1280×720	45.00	60.00	HDTV 720p
10.	1920×1080	31.25	50.00	HDTV 1080i
11.	1920×1080	33.75	60.00	HDTV 1080i
12.	1920×1080	33.72	59.94	HDTV 1080i
13.	1920×1080	56.250	50	HDTV 1080p
14.	1920×1080	67.5	60	HDTV 1080p

(2) HDMI Input (PC/DTV)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	
HDMI-PC						DDC
1	640*350	31.468	70.09	25.17	EGA	X
2	720*400	31.469	70.08	28.32	DOS	O
3	640*480	31.469	59.94	25.17	VESA(VGA)	O
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6	1152*864	54.348	60.053	80	VESA	O
7	1280*1024	63.981	60.020	108	VESA(SXGA)	O
8	1360*768	47.712	60.015	85.5	VESA(WXGA)	O
9	1920*1080	67.5	60.00	148.5	WUXGA(Reduced Blanking)	O
10	3840*2160	67.5	30.00	297.00	UD	
11	3840*2160	56.25	25.00	297.00	UD	
12	3840*2160	54.0	24.00	297.00	UD	
HDMI-DTV						
1	720*480	31.47	60	27.027	SDTV 480P	
2	720*480	31.47	59.94	27.00	SDTV 480P	
3	1280*720	45.00	60.00	74.25	HDTV 720P	
4	1280*720	44.96	59.94	74.176	HDTV 720P	
5	1920*1080	33.75	60.00	74.25	HDTV 1080I	
6	1920*1080	33.72	59.94	74.176	HDTV 1080I	
7	1920*1080	67.500	60	148.50	HDTV 1080P	
8	1920*1080	67.432	59.939	148.352	HDTV 1080P	
9	1920*1080	27.000	24.000	74.25	HDTV 1080P	
10	1920*1080	26.97	23.976	74.176	HDTV 1080P	
11	1920*1080	33.75	30.000	74.25	HDTV 1080P	
12	1920*1080	33.71	29.97	74.176	HDTV 1080P	
13	3840*2160	67.5	30.00	297.00	UDTV 2160P	
14	3840*2160	56.25	25.00	297.00	UDTV 2160P	
15	3840*2160	54.0	24.00	297.00	UDTV 2160P	

5.2. 3D Mode

(1) RF Input(3D supported mode manually)

No.	Resolution	Proposed	3D input proposed mode
1	HD - DTV	1080I 720P	2D to 3D Side by Side(Half) Top & Bottom
2	SD - DTV	576P 576I	
3	SD - ATV(CVBS/SCART)		

(2) RF Input(3D supported mode automatically)

No.	Signal	3D input proposed mode
1	Frame Compatible	Side by Side(Half), Top & Bottom

(3) HDMI 1.3 (3D supported mode manually)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	720*480	31.5	60	27.03	SDTV 480P	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Frame Sequential, Row Interleaving, Column Interleaving
2	720*576	31.25	50	27	SDTV 576P	
3	1280*720	45.00	60.00	74.25	HDTV 720P	
4	1280*720	37.500	50	74.25	HDTV 720P	
5	1920*1080	33.75	60.00	74.25	HDTV 1080I	2D to 3D, Side by Side(Half), Top & Bottom
6	1920*1080	28.125	50.00	74.25	HDTV 1080I	
7	1920*1080	27.00	24.00	74.25	HDTV 1080P	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Row Interleaving, Column Interleaving
8	1920*1080	28.12	25	74.25	HDTV 1080P	
9	1920*1080	33.75	30.00	74.25	HDTV 1080P	
10	1920*1080	67.50	60.00	148.5	HDTV 1080P	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Single Frame Sequential, Row Interleaving, Column Interleaving
11	1920*1080	56.250	50	148.5	HDTV 1080P	
12	3840*2160	53.95	23.976	297.00	HDTV 2160P	2D to 3D, Top & Bottom(half), Side by Side(half)
		54	24.00	296.703		
		56.25	25.00	297.00		
		61.43	29.970	297.00		
		67.5	30.00	296.703		

(4) HDMI 1.4b (3D supported mode automatically)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	VIC	3D input proposed mode	Proposed
1	640*480	31.469 / 31.5	59.94/ 60	25.125/25.2	1	Top-and-Bottom Side-by-side(half)	Secondary(SDTV 480P) Secondary(SDTV 480P)
2		62.938/63	59.94/ 60	50.35/50.4	1	Frame packing Line alternative	Secondary(SDTV 480P) (SDTV 480P)
3		31.469 / 31.5	59.94/ 60	50.35/50.4	1	Side-by-side(Full)	(SDTV 480P)
4	720*480	31.469 / 31.5	59.94 / 60	27.00/27.03	2,3	Top-and-Bottom Side-by-side(half)	Secondary(SDTV 480P) Secondary(SDTV 480P)
5		62.938/63	59.94 / 60	54/54.06	2,3	Frame packing Line alternative	Secondary(SDTV 480P) (SDTV 480P)
6		31.469 / 31.5	59.94 / 60	54/54.06	2,3	Side-by-side(Full)	(SDTV 480P)
7	720*576	31.25	50	27	17,18	Top-and-Bottom Side-by-side(half)	Secondary(SDTV 576P) Secondary(SDTV 576P)
8		62.5	50	54	17,18	Frame packing Line alternative	Secondary(SDTV 576P) (SDTV 576P)
9		31.25	50	54	17,18	Side-by-side(Full)	(SDTV 576P)
10	1280*720	37.500	50	74.25	19	Top-and-Bottom Side-by-side(half)	Primary(HDTV 720P) Primary(HDTV 720P)
11		75	50	148.5	19	Frame packing Field alternative	Primary(HDTV 720P) (HDTV 720P)
12		37.500	50	148.5	19	Side-by-side(Full)	(HDTV 720P)
13		44.96 / 45	59.94 / 60	74.18/74.25	4	Top-and-Bottom Side-by-side(half)	Primary(HDTV 720P) Primary(HDTV 720P)
14		89.91/90	59.94 / 60	148.35/148.5	4	Frame packing Line alternative	Primary(HDTV 720P) (HDTV 720P)
15		44.96 / 45	59.94 / 60	148.35/148.5	4	Side-by-side(Full)	(HDTV 720P)
16	1920*1080	33.72 / 33.75	59.94 / 60	74.18/74.25	5	Top-and-Bottom Side-by-side(half)	Secondary(HDTV 1080I) Primary(HDTV 1080I)
17		67.432/67.50	59.94 / 60	148.35/148.5	5	Frame packing Line alternative	Primary(HDTV 1080I) (HDTV 1080I)
18		33.72 / 33.75	59.94 / 60	148.35/148.5	5	Side-by-side(Full)	(HDTV 1080I)
19		28.125	50.00	74.25	20	Top-and-Bottom Side-by-side(half)	Secondary(HDTV 1080I) Primary(HDTV 1080I)
20		56.25	50.00	148.5	20	Frame packing Field alternative	Primary(HDTV 1080I) (HDTV 1080I)
21		28.125	50.00	148.5	20	Side-by-side(Full)	(HDTV 1080I)
22		26.97 / 27	23.97 / 24	74.18/74.25	32	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Primary(HDTV 1080P)
23		43.94/54	23.97 / 24	148.35/148.5	32	Frame packing Field alternative	Primary(HDTV 1080P) (HDTV 1080P)
24		26.97 / 27	23.97 / 24	148.35/148.5	32	Side-by-side(Full)	(HDTV 1080P)
25		28.12	25	74.25	33	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Primary(HDTV 1080P)
26		56.24	25	148.5	33	Frame packing Line alternative	Primary(HDTV 1080P) (HDTV 1080P)
27		28.12	25	148.5	33	Side-by-side(Full)	(HDTV 1080P)
28		33.716 / 33.75	29.976 / 30.00	74.18/74.25	34	Top-and-Bottom Side-by-side(half)	Secondary(HDTV 1080P) Secondary(HDTV 1080P)
29		67.432 / 67.5	29.976 / 30.00	148.35/148.5	34	Frame packing Line alternative	Secondary(HDTV 1080P) (HDTV 1080P)
30		33.716 / 33.75	29.976 / 30.00	148.35/148.5	34	Side-by-side(Full)	(HDTV 1080P)
31		56.250	50	148.5	31	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Secondary(HDTV 1080P)
32		67.43 / 67.5	59.94 / 60	148.35/148.50	16	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Secondary(HDTV 1080P)

(5) HDMI-PC Input (3D) (3D supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode	Proposed
1	1024*768	48.36	60	65	2D to 3D, Side by Side(half) Top & Bottom	HDTV 768P
2	1360*768	47.71	60	85.5	2D to 3D, Side by Side(half) Top & Bottom	HDTV 768P
3	1920*1080	67.500	60	148.50	2D to 3D, Side by Side(half) Top & Bottom, Checker Board, Single Frame Sequential, Row Interleaving, Column Interleaving	HDTV 1080P
4	3840*2160	54 56.25 67.5	24 25 30	296.703 297 296.703	HDTV 2160P	2D to 3D, Top & Bottom(half), Side by Side(half),
5	3840*2160	-	-	-	2D to 3D	640*350 720*400 640*480 800*600 1152*864

(6) Component Input (3D) (3D supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock	3D input proposed mode	Proposed
1	1280*720	37.5	50	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 720P
2	1280*720	45.00	60.00	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 720P
3	1280*720	44.96	59.94	74.176	2D to 3D, Side by Side(half), Top & Bottom	HDTV 720P
4	1920*1080	33.75	60.00	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080I
5	1920*1080	33.72	59.94	74.176	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080I
6	1920*1080	28.12	50	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080I
7	1920*1080	67.500	60	148.50	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
8	1920*1080	67.432	59.94	148.352	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
9	1920*1080	27.000	24.000	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
10	1920*1080	28.12	25	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
11	1920*1080	56.25	50	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
12	1920*1080	26.97	23.976	74.176	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
13	1920*1080	33.75	30.000	74.25	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P
14	1920*1080	33.71	29.97	74.176	2D to 3D, Side by Side(half), Top & Bottom	HDTV 1080P

(7) USB, DLNA - Movie (3D) (3D supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode
1	Under 704x480	-	-	-	2D to 3D
2	Over 704x480 interlaced	-	-	-	2D to 3D, Side by Side(Half), Top & Bottom
3	Over 704x480	-	50 / 60	-	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Row Interleaving, Column Interleaving, Frame Sequential
4	progressive	-	others	-	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Row Interleaving, Column Interleaving

(8) USB, DLNA -Photo (3D) (3D supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode
1	Under 320x240	-	-	-	2D to 3D
2	Over 320x240	-	-	-	2D to 3D, Side by Side(Half), Top & Bottom









(9) USB, DLNA (3D) (3D supported mode automatically)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode
1	1080p	33.75	30	74.25	Side by Side(Half), Top & Bottom, Checker Board, MPO(Photo), JPS(Photo)

(10) Miracast, Widi (3D supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode
1	1024x768p	-	30 / 60	-	2D to 3D, Side by Side(Half), Top & Bottom
2.	1280x720p	-	30 / 60	-	
3	1920x1080p		30 / 60		
4	Others		-		2D to 3D

■ Remark: 3D Input mode

No.	Side by Side	Top & Bottom	Checker board	Single Frame Sequential	Frame Packing	Line Interleaving	Column Interleaving	2D to 3D
1								

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LED TV with LD34N chassis.

2. Designation

- (1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
- (2) Adjustment must be done in the correct order.
- (3) The adjustment must be performed in the circumstance of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ of temperature and $65\% \pm 10\%$ of relative humidity if there is no specific designation.
- (4) The input voltage of the receiver must keep AC 100-240 V~, 50/60 Hz.
- (5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.

In case of keeping module is in the circumstance of 0 °C, it should be placed in the circumstance of above 15 °C for 2 hours.

In case of keeping module is in the circumstance of below -20°C , it should be placed in the circumstance of above 15°C for 3 hours.

[Caution]

When still image is displayed for a period of 20 minutes or longer (Especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area.

3. Automatic Adjustment

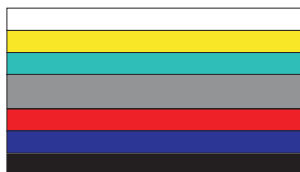
3.1. ADC Adjustment

3.1.1. Overview

ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.

3.1.2. Equipment & Condition

- (1) USB to RS-232C Jig
- (2) MSPG-925 Series Pattern Generator (MSPG-925FA, pattern - 65)
 - Resolution : 480i Comp1
1080P Comp1
1920*1080P SCART RGB
 - Pattern : Horizontal 100% Color Bar Pattern
 - Pattern level : 0.7 ± 0.1 Vp-p
 - Image



3.1.3. Adjustment

- (1) Adjustment method
- Using RS-232, adjust items in the other shown in
"3.1.3.3")

- (2) Adj. protocol

Protocol	Command	Set ACK
Enter adj. mode	aa 00 00	a 00 OK00x
Source change	xb 00 04 xb 00 06	b 00 OK04x (Adjust 480i, 1080p Comp1) b 00 OK06x (Adjust 1920*1080 SCART RGB)
Begin adj.	ad 00 10	
Return adj. result		OKx (Case of Success) NGx (Case of Fail)
Read adj. data	(main) ad 00 20 (sub) ad 00 21	(main) 000000000000000000000007c007b006dx (Sub) 00000007000000000000000007c00830077x
Confirm adj.	ad 00 99	NG 03 00x (Fail) NG 03 01x (Fail) NG 03 02x (Fail) OK 03 03x (Success)
End adj.	aa 00 90	a 00 OK90x

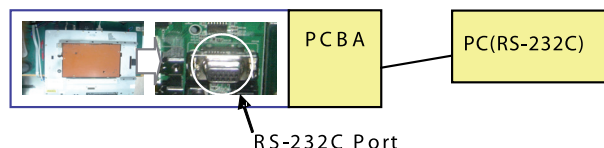
Ref.) ADC Adj. RS232C Protocol Ver1.0

- (3) Adj. order

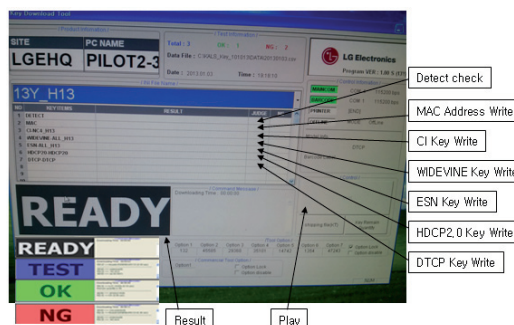
- ```
- aa 00 00 [Enter ADC adj. mode]
- xb 00 04 [Change input source to Component1 (480i&
1080p)]
- ad 00 10 [Adjust 480i&1080p Comp1]
- xb 00 06 [Change input source to RGB(1024*768)]
- ad 00 10 [Adjust 1920*1080 SCART RGB]
- ad 00 90 End adj.
```

### 3.2. MAC address D/L, CI+ key D/L, Widevine key D/L, ESN key D/L, HDCP key D/L, DTCP key D/L

Connect: PCBA Jig → RS-232C Port== PC → RS-232C Port  
Communication Prot connection



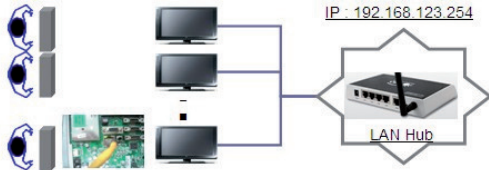
- Com 1,2,3,4 and 115200(Baudrate)  
Mode check: Online Only
- Check the test process: DETECT → MAC → CI → Widevine  
→ ESN → HDCP → DTCP
- Play: START
- Result: Ready, Test, OK or NG
- Printer Out (MAC Address Label)



### 3.3. LAN Inspection

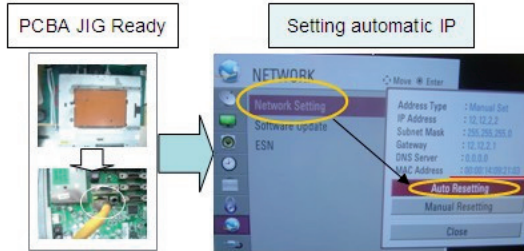
#### 3.3.1. Equipment & Condition

- Each other connection to LAN Port of IP Hub and Jig



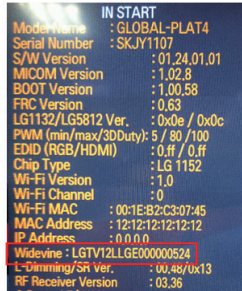
#### 3.3.2. LAN inspection solution

- LAN Port connection with PCB
- Network setting at MENU Mode of TV
- Setting automatic IP
- Setting state confirmation
  - If automatic setting is finished, you confirm IP and MAC Address.



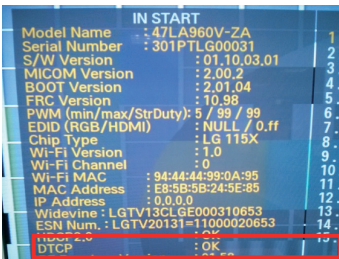
#### 3.3.3. WIDEVINE key Inspection

- Confirm key input data at the "IN START" MENU Mode.



#### 3.3.4. DTCP Inspection

- Confirm Key input at the "IN START" MENU Mode
- Below DTCP check on "IN START" MENU is enabled only for Models which "DTCP key" tool option is "ON"
- Only EU suffix models DTCP key option is on. (ex. 47LA790V-ZA.KEUYLJG)



### 3.4. LAN PORT INSPECTION(PING TEST)

Connect SET → LAN port == PC → LAN Port

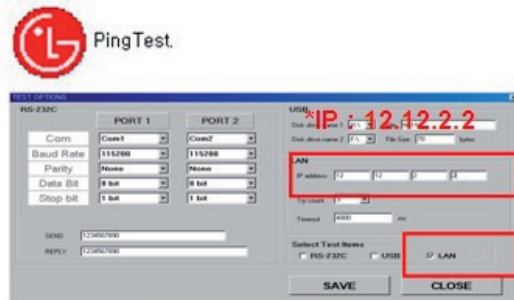


#### 3.4.1. Equipment setting

- Play the LAN Port Test PROGRAM.
- Input IP set up for an inspection to Test Program.
  - \*IP Number : 12.12.2.2

#### 3.4.2. LAN PORT inspection(PING TEST)

- Play the LAN Port Test Program.
- Connect each other LAN Port Jack.
- Play Test (F9) button and confirm OK Message.
- Remove LAN cable.



### 3.5. Model name & Serial number Download

#### 3.5.1. Model name & Serial number D/L

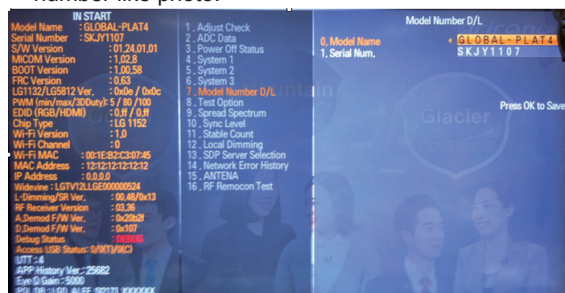
- Press "Power on" key of service remote control.  
(Baud rate : 115200 bps)
- Connect RS-232C Signal to USB Cable to USB.
- Write Serial number by use USB port.
- Must check the serial number at Instart menu.

#### 3.5.2. Method & notice

- Serial number D/L is using of scan equipment.
- Setting of scan equipment operated by Manufacturing Technology Group.
- Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

\* Manual Download (Model Name and Serial Number)  
If the TV set is downloaded by OTA or service man, sometimes model name or serial number is initialized.(Not always)  
It is impossible to download by bar code scan, so It need Manual download.

- Press the "Instart" key of Adjustment remote control.
- Go to the menu "7.Model Number D/L" like below photo.
- Input the Factory model name(ex 47LM960V-ZB) or Serial number like photo.

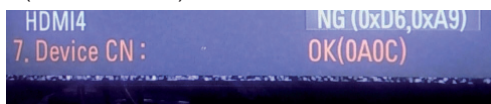


- Check the model name Instart menu. → Factory name displayed. (ex 47LM960V-ZB)
- Check the Diagnostics.(DTV country only) → Buyer model displayed. (ex 47LM960V-ZB)

### 3.6. CI+ Key checking method

\* Check the Section 3.2

Check whether the key was downloaded or not at 'In Start' menu. (Refer to below).



=> Check the Download to CI+ Key value in LGset.

#### 3.6.1. Check the method of CI+ Key value

- Check the method on Instart menu
- Check the method of RS232C Command
  - Into the main ass'y mode(RS232: aa 00 00)

| CMD 1 | CMD 2 | Data 0 |
|-------|-------|--------|
| A     | A     | 0 0    |

- Check the key download for transmitted command (RS232: ci 00 10)

| CMD 1 | CMD 2 | Data 0 |
|-------|-------|--------|
| C     | I     | 1 0    |

- Result value

- Normally status for download : OKx
- Abnormally status for download : NGx

#### 3.6.2. Check the method of CI+ key value(RS232)

- Into the main ass'y mode(RS232: aa 00 00)

| CMD 1 | CMD 2 | Data 0 |
|-------|-------|--------|
| A     | A     | 0 0    |

- Check the mothod of CI+ key by command (RS232: ci 00 20)

| CMD 1 | CMD 2 | Data 0 |
|-------|-------|--------|
| C     | I     | 2 0    |

- Result value

i 01 OK 1d1852d21c1ed5dcx

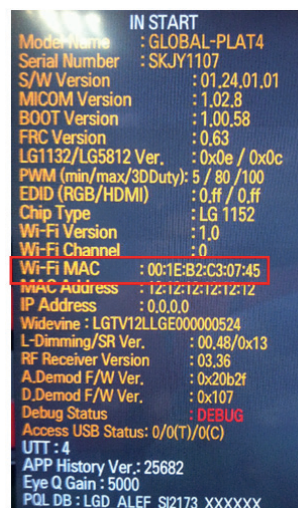
→ CI+ Key Value

### 3.7. WIFI MAC ADDRESS CHECK

- Using RS232 Command

|              | H-freq(kHz)            | V-freq.(Hz)       |
|--------------|------------------------|-------------------|
| Transmission | [A][I][Set ID][20][Cr] | [O][K][X] or [NG] |

- Check the menu on in-start



## 4. Manual Adjustment

\* ADC adjustment is not needed because of OTP(Auto ADC adjustment)

### 4.1. EDID(The Extended Display Identification Data)/DDC(Display Data Channel) download

#### 4.1.1. Overview

It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of "Plug and Play".

#### 4.1.2. Equipment

- Since embedded EDID data is used, EDID download JIG, HDMI cable and D-sub cable are not need.
- Adjustment remote control

#### 4.1.3. Download method

- (1) Press "ADJ" key on the Adjustment remote control then select "12.EDID D/L", By pressing "Enter" key, enter EDID D/L menu.
- (2) Select "Start" button by pressing "Enter" key, HDMI1/ HDMI2/ HDMI3 are writing and display OK or NG.



#### 4.1.4. EDID DATA

##### • HDMI

|      | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0x00 | 00   | FF   | FF   | FF   | FF   | FF   | FF   | 00   | 1E   | 6D   | (a)  |      | (b)  |      |      |      |
| 0x01 | (c)  |      | 01   | 03   | 80   | A0   | 5A   | 78   | 0A   | EE   | 91   | A3   | 54   | 4C   | 99   | 26   |
| 0x02 | 0F   | 50   | 54   | A1   | 08   | 00   | 31   | 40   | 45   | 40   | 61   | 40   | 71   | 40   | 81   | 80   |
| 0x03 | 01   | 01   | 01   | 01   | 01   | 01   | 02   | 3A   | 80   | 18   | 71   | 38   | 2D   | 40   | 58   | 2C   |
| 0x04 | 45   | 00   | 40   | 84   | 63   | 00   | 00   | 1E   | 66   | 21   | 50   | B0   | 51   | 00   | 1B   | 30   |
| 0x05 | 40   | 70   | 36   | 00   | 40   | 84   | 63   | 00   | 00   | 1E   | 00   | 00   | 00   | FD   | 00   | 3A   |
| 0x06 | 3E   | 1E   | 53   | 10   | 00   | 0A   | 20   | 20   | 20   | 20   | 20   | 20   | (d)  |      |      |      |
| 0x07 | (d)  |      |      |      |      |      |      |      |      |      |      |      |      |      | 01   | ⓔ1   |
| 0x08 | 02   | 03   | 3A   | F1   | 4E   | 10   | 9F   | 04   | 13   | 05   | 14   | 03   | 02   | 12   | 20   | 21   |
| 0x09 | 22   | 15   | 01   | 29   | 3D   | 06   | C0   | 15   | 07   | 50   | 09   | 57   | 07   | (f)  |      |      |
| 0x0A | (f)  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0x0B | (f)  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0x0C | (f)  |      |      |      |      |      | E3   | 05   | 03   | 01   | 02   | 3A   | 80   | 18   | 71   | 38   |
| 0x0D | 2D   | 40   | 58   | 2C   | 45   | 00   | 40   | 84   | 63   | 00   | 00   | 1E   | 01   | 1D   | 80   | 18   |
| 0x0E | 71   | 1C   | 16   | 20   | 58   | 2C   | 25   | 00   | 40   | 84   | 63   | 00   | 00   | 9E   | 01   | 1D   |
| 0x0F | 00   | 72   | 51   | D0   | 1E   | 20   | 6E   | 28   | 55   | 00   | 40   | 84   | 63   | 00   | 00   | 1E   |
| 0x10 | 00   | 00   | 00   | 00   | 00   | 00   | 00   | 00   | 00   | 00   | 00   | 00   | 00   | 00   | 00   | ⓔ1   |

##### • Detail EDID Options are below

- HDMI1 ~ HDMI3

- In the data of EDID, bellows may be different by S/W or Input mode.

##### (a) Product ID

| MODEL NAME   | HEX  | EDID Table | DDC Function   |
|--------------|------|------------|----------------|
| HD/FHD Model | 0001 | 01 00      | Analog/Digital |

(b) Serial No: Controlled on production line.

(c) Month, Year: Controlled on production line:

ex) Monthly : '01' → '01', Year : '2013' → '17'

##### (d) Model Name(Hex): LGTV

Cf) TV set's model name in EDID data is below.

| MODEL NAME | MODEL NAME(HEX)                                            |
|------------|------------------------------------------------------------|
| LG TV      | 00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 (LG TV) |

##### (e) Checksum(LG TV): Changeable by total EDID data.

| EDID C/S data   |         | FHD        |
|-----------------|---------|------------|
|                 |         | HDMI       |
| check sum (Hex) | Block 0 | 42         |
|                 | Block 1 | 23 (HDMI1) |
|                 |         | 13 (HDMI2) |

##### (f) Vendor Specific(HDMI)

| INPUT | MODEL NAME(HEX)  |
|-------|------------------|
| HDMI1 | 78030C001000801E |
| HDMI2 | 78030C002000801E |

##### (1) EDID

##### # HDMI 1(C/S : E8 81)

##### EDID Block 0, Bytes 0-127 [00H-7FH]

|    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 1E | 6D | 01 | 00 | 01 | 01 | 01 | 01 |
| 10 | 01 | 17 | 01 | 03 | 80 | A0 | 5A | 78 | 0A | EE | 91 | A3 | 54 | 4C | 99 | 26 |
| 20 | 0F | 50 | 54 | A1 | 08 | 00 | 31 | 40 | 45 | 40 | 61 | 40 | 71 | 40 | 81 | 80 |
| 30 | 01 | 01 | 01 | 01 | 01 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C |
| 40 | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B | 30 |
| 50 | 40 | 70 | 36 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 | 3A |
| 60 | 3E | 1E | 53 | 10 | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 00 | 00 | FC |
| 70 | 00 | 4C | 47 | 20 | 54 | 56 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 01 | E8 |

##### EDID Block 1, Bytes 128-255 [80H-FFH]

|    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 80 | 02 | 03 | 3E | F1 | 4E | 10 | 9F | 04 | 13 | 05 | 14 | 03 | 02 | 12 | 20 | 21 |
| 90 | 22 | 15 | 01 | 29 | 3D | 06 | C0 | 15 | 07 | 50 | 09 | 57 | 07 | 7C | 03 | 0C |
| A0 | 00 | 10 | 00 | B8 | 3C | 20 | C0 | 8E | 01 | 02 | 03 | 04 | 01 | 4F | 3F | FC |
| B0 | 08 | 10 | 18 | 10 | 06 | 10 | 16 | 10 | 28 | 10 | E3 | 05 | 03 | 01 | 02 | 3A |
| C0 | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E |
| D0 | 01 | 1D | 80 | 18 | 71 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | 40 | 84 | 63 | 00 |
| E0 | 00 | 9E | 01 | 1D | 00 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | 40 | 84 |
| F0 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | E0 |

##### # HDMI 2(C/S : E8 D0)

##### EDID Block 0, Bytes 0-127 [00H-7FH]

|    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 1E | 6D | 01 | 00 | 01 | 01 | 01 | 01 |
| 10 | 01 | 17 | 01 | 03 | 80 | A0 | 5A | 78 | 0A | EE | 91 | A3 | 54 | 4C | 99 | 26 |
| 20 | 0F | 50 | 54 | A1 | 08 | 00 | 31 | 40 | 45 | 40 | 61 | 40 | 71 | 40 | 81 | 80 |
| 30 | 01 | 01 | 01 | 01 | 01 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C |
| 40 | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B | 30 |
| 50 | 40 | 70 | 36 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 | 3A |
| 60 | 3E | 1E | 53 | 10 | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 00 | 00 | FC |
| 70 | 00 | 4C | 47 | 20 | 54 | 56 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 01 | E8 |

##### EDID Block 1, Bytes 128-255 [80H-FFH]

|    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 80 | 02 | 03 | 3E | F1 | 4E | 10 | 9F | 04 | 13 | 05 | 14 | 03 | 02 | 12 | 20 | 21 |
| 90 | 22 | 15 | 01 | 29 | 3D | 06 | C0 | 15 | 07 | 50 | 09 | 57 | 07 | 7C | 03 | 0C |
| A0 | 00 | 10 | 00 | B8 | 3C | 20 | C0 | 8E | 01 | 02 | 03 | 04 | 01 | 4F | 3F | FC |
| B0 | 08 | 10 | 18 | 10 | 06 | 10 | 16 | 10 | 28 | 10 | E3 | 05 | 03 | 01 | 02 | 3A |
| C0 | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E |
| D0 | 01 | 1D | 80 | 18 | 71 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | 40 | 84 | 63 | 00 |
| E0 | 00 | 9E | 01 | 1D | 00 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | 40 | 84 |
| F0 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | D0 |



## # HDMI 3(C/S : E8 C0)

### EDID Block 0, Bytes 0-127 [00H-7FH]

| 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 1E | 6D | 01 | 00 | 01 | 01 | 01 |
| 10 | 01 | 17 | 01 | 03 | 80 | A0 | 5A | 78 | 0A | EE | 91 | A3 | 54 | 4C | 99 |
| 20 | 0F | 50 | 54 | A1 | 08 | 00 | 31 | 40 | 45 | 40 | 61 | 40 | 71 | 40 | 81 |
| 30 | 01 | 01 | 01 | 01 | 01 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D | 40 | 58 |
| 40 | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B |
| 50 | 40 | 70 | 36 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 |
| 60 | 3E | 1E | 53 | 10 | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | 00 | 00 | FC |
| 70 | 00 | 4C | 47 | 20 | 54 | 56 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | 01 | E8 |

### EDID Block 1, Bytes 128-255 [80H-FFH]

| 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 80 | 02 | 03 | 3E | F1 | 4E | 10 | 9F | 04 | 13 | 05 | 14 | 03 | 02 | 12 | 20 |
| 90 | 22 | 15 | 01 | 29 | 3D | 06 | C0 | 15 | 07 | 50 | 09 | 57 | 07 | 7C | 03 |
| A0 | 00 | 10 | 00 | B8 | 3C | 20 | C0 | 8E | 01 | 02 | 03 | 04 | 01 | 4F | 3F |
| B0 | 08 | 10 | 18 | 10 | 06 | 10 | 16 | 10 | 28 | 10 | E3 | 05 | 03 | 01 | 02 |
| C0 | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C | 45 | 00 | 40 | 84 | 63 | 00 | 00 |
| D0 | 01 | 1D | 80 | 18 | 71 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | 40 | 84 | 63 |
| E0 | 00 | 9E | 01 | 1D | 00 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | 40 |
| F0 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | C0 |

## 4.2. White Balance Adjustment

### 4.2.1. Overview

- W/B adj. Objective & How-it-works
  - Objective: To reduce each Panel's W/B deviation
  - How-it-works : When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.
  - Adjustment condition : normal temperature
    - Surrounding Temperature : 25 °C ± 5 °C
    - Warm-up time: About 5 Min
    - Surrounding Humidity : 20 % ~ 80 %
    - Before White balance adjustment, Keep power on status, don't power off

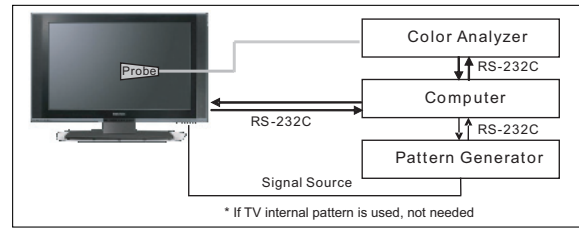
### 4.2.2. Adj. condition and cautionary items

- Lighting condition in surrounding area surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.
- Probe location: Color Analyzer (CA-210) probe should be within 10cm and perpendicular of the module surface (80°~ 100°)
- Aging time
  - After Aging Start, Keep the Power ON status during 5 Minutes.
  - In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

### 4.2.3. Equipment

- Color Analyzer: CA-210 (LED Module : CH 14)
  - Adjustment Computer(During auto adj., RS-232C protocol is needed)
  - Adjustment Remote control
  - Video Signal Generator MSPG-925F 720p/216-Gray (Model: 217, Pattern: 49)
    - Only when internal pattern is not available
- Color Analyzer Matrix should be calibrated using CS-100.

## 4.2.4. Equipment connection MAP



## 4.2.5. Adj. Command (Protocol)

### <Command Format>

| START | 6E | A | 50 | A | LEN | A | 03 | A | CMD | A | 00 | A | VAL | A | CS | STOP |
|-------|----|---|----|---|-----|---|----|---|-----|---|----|---|-----|---|----|------|
|-------|----|---|----|---|-----|---|----|---|-----|---|----|---|-----|---|----|------|

- LEN: Number of Data Byte to be sent
  - CMD: Command
  - VAL: FOS Data value
  - CS: Checksum of sent data
  - A: Acknowledge
- Ex) [Send: JA\_00\_DD] / [Ack: A\_00\_okDDX]

- RS-232C Command used during auto-adjustment.

| RS-232C COMMAND | [CMD ID DATA] |    | Explanation                                                 |
|-----------------|---------------|----|-------------------------------------------------------------|
| wb              | 00            | 00 | Begin White Balance adjustment                              |
| wb              | 00            | 10 | Gain adjustment(internal white pattern)                     |
| wb              | 00            | 1f | Gain adjustment completed                                   |
| wb              | 00            | 20 | Offset adjustment(internal white pattern)                   |
| wb              | 00            | 2f | Offset adjustment completed                                 |
| wb              | 00            | ff | End White Balance adjustment (internal pattern disappears ) |

- Ex) wb 00 00 -> Begin white balance auto-adj.  
 wb 00 10 -> Gain adj.  
 ja 00 ff -> Adj. data  
 jb 00 c0  
 ...  
 ...  
 wb 00 1f -> Gain adj. completed  
 \*(wb 00 20(Start), wb 00 2f(end)) -> Off-set adj.  
 wb 00 ff -> End white balance auto-adj.

- Adj. Map

|        | Adj. item | Command (lower caseASCII) |      | Data Range (Hex.) |     | Default (Decimal) |
|--------|-----------|---------------------------|------|-------------------|-----|-------------------|
|        |           | CMD1                      | CMD2 | MIN               | MAX |                   |
| Cool   | R Gain    | j                         | g    | 00                | C0  |                   |
|        | G Gain    | j                         | h    | 00                | C0  |                   |
|        | B Gain    | j                         | i    | 00                | C0  |                   |
|        | R Cut     |                           |      |                   |     |                   |
|        | G Cut     |                           |      |                   |     |                   |
|        | B Cut     |                           |      |                   |     |                   |
| Medium | R Gain    | j                         | a    | 00                | C0  |                   |
|        | G Gain    | j                         | b    | 00                | C0  |                   |
|        | B Gain    | j                         | c    | 00                | C0  |                   |
|        | R Cut     |                           |      |                   |     |                   |
|        | G Cut     |                           |      |                   |     |                   |
|        | B Cut     |                           |      |                   |     |                   |
| Warm   | R Gain    | j                         | d    | 00                | C0  |                   |
|        | G Gain    | j                         | e    | 00                | C0  |                   |
|        | B Gain    | j                         | f    | 00                | C0  |                   |
|        | R Cut     |                           |      |                   |     |                   |
|        | G Cut     |                           |      |                   |     |                   |
|        | B Cut     |                           |      |                   |     |                   |

#### 4.2.6. Adj. method

##### (1) Auto adj. method

- 1) Set TV in adj. mode using POWER ON key.
  - 2) Zero calibrate probe then place it on the center of the Display.
  - 3) Connect Cable.(RS-232C to USB)
  - 4) Select mode in adj. Program and begin adj.
  - 5) When adj. is complete (OK Sign), check adj. status pre mode. (Warm, Medium, Cool)
  - 6) Remove probe and RS-232C cable to complete adj.
- W/B Adj. must begin as start command "wb 00 00" , and finish as end command "wb 00 ff", and Adj. offset if need.

##### (2) Manual adjustment method (LA965x)

- 1) Set TV in Adj. mode using POWER ON.
  - 2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10 cm of the surface.
  - 3) Press ADJ key → EZ adjust using adj. R/C → 9. White-Balance then press the cursor to the right(key ►). When right key(►) is pressed 216 Gray internal pattern will be displayed
  - 4) Adjust Cool modes
    - a. Fix the one of R/G/B gain to 192 (default data) and decrease the others. (If G gain is adjusted over 172 and R and B gain less than 192 , Adjust is O.K.)
    - b. If G gain is less than 172, Increase G gain by up to 172, and then increase R gain and G gain same amount of increasing G gain.
    - c. If R gain or B gain is over 255, Readjust G gain less than 172, Conform to R gain is 255 or B gain is 255
  - 5) Adjust two modes(Medium/Warm) Fix the one of R/G/B gain to 192(default data) and decrease the others.
  - 6) Adjustment is completed, Exit adjust mode using "EXIT" key on Remote control.
- If internal pattern is not available, use RF input. In EZ Adj. menu 6.White Balance, you can select one of 2 Test-pattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 206 Gray pattern.

##### \* CASE Cool

First adjust the coordinate far away from the target value(x, y).

1. x, y > target
  - i) Decrease the R, G.
2. x, y < target
  - i) First decrease the B gain,
3. x > target, y < target
  - i) First decrease B, so make y a little more than the target.
  - ii) Adjust x value by decreasing the R
4. x < target, y > target
  - i) First decrease B, so make x a little more than the target.
  - ii) Adjust x value by decreasing the G

##### How to adjust

1. If G gain is adjusted over 172 and R gain and B gain less than 192 , Adjust is O.K.
2. If G gain is less than 172 , increase G gain by up to 172, and then increase R gain and B gain same amount of increasing G gain.
3. If R gain or B gain is over 255 , Readjust G gain less than 172, Conform to R gain is 255 or B gain is 255

##### \* CASE Medium / Warm

First adjust the coordinate far away from the target value(x, y).

1. x, y > target
  - i) Decrease the R, G.
2. x, y < target
  - i) First decrease the B gain,
  - ii) Decrease the one of the others.
3. x > target, y < target
  - i) First decrease B, so make y a little more than the target.
  - ii) Adjust x value by decreasing the R
4. x < target, y > target
  - i) First decrease B, so make x a little more than the target.
  - ii) Adjust y value by decreasing the G

##### ▪ Adjustment condition and cautionary items

- 1) Lighting condition in surrounding area  
Surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.
- 2) Probe location  
: Color Analyzer(CA-210) probe should be within 10 cm and perpendicular of the module surface (80° ~ 100°)
- 3) Aging time  
- After Aging Start, Keep the Power ON status during 5 Minutes.  
- In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

#### 4.2.7. Reference (White balance Adj. coordinate and color temperature)

##### ▪ Luminance : 216 Gray

##### ▪ Standard color coordinate and temperature using CS-1000 (over 26 inch)

| Mode   | Coordinate |       | Temp    | Δuv    |
|--------|------------|-------|---------|--------|
|        | x          | y     |         |        |
| Cool   | 0.271      | 0.270 | 13000 K | 0.0000 |
| Medium | 0.285      | 0.293 | 9300 K  | 0.0000 |
| Warm   | 0.310      | 0.325 | 6500 K  | 0.0000 |

##### ▪ Standard color coordinate and temperature using CA-210(CH 18)

| Mode   | Coordinate    |               | Temp    | Δuv    |
|--------|---------------|---------------|---------|--------|
|        | x             | y             |         |        |
| Cool   | 0.271 ± 0.002 | 0.270 ± 0.002 | 13000 K | 0.0000 |
| Medium | 0.285 ± 0.002 | 0.293 ± 0.002 | 9300 K  | 0.0000 |
| Warm   | 0.310 ± 0.002 | 0.325 ± 0.002 | 6500 K  | 0.0000 |

#### 4.2.8. EDGE LED White balance table

- (1) EDGE LED module change color coordinate because of aging time.
- (2) Apply under the color coordinate table, for compensated aging time.
- (3) Normal line(Edge, Direct)  
- Gumi (Mar ~ Dec) & Global

| NC4.0 | Aging time (Min) | Cool |     | Medium |     | Warm |     |
|-------|------------------|------|-----|--------|-----|------|-----|
|       |                  | X    | y   | x      | y   | x    | y   |
|       |                  | 271  | 270 | 285    | 293 | 313  | 329 |
| 1     | 0-2              | 281  | 287 | 295    | 310 | 320  | 342 |
| 2     | 3-5              | 280  | 285 | 294    | 308 | 319  | 340 |
| 3     | 6-9              | 278  | 284 | 292    | 307 | 317  | 339 |
| 4     | 10-19            | 276  | 281 | 290    | 304 | 315  | 336 |
| 5     | 20-35            | 275  | 277 | 289    | 300 | 314  | 332 |
| 6     | 36-49            | 274  | 274 | 288    | 297 | 313  | 329 |
| 7     | 50-79            | 273  | 272 | 287    | 295 | 312  | 327 |
| 8     | 80-119           | 272  | 271 | 286    | 294 | 311  | 326 |
| 9     | Over 120         | 271  | 270 | 285    | 293 | 310  | 325 |

#### (4) Aging Chamber

| NC4.0 | Aging time (Min) | Cool |     | Medium |     | Warm |     |
|-------|------------------|------|-----|--------|-----|------|-----|
|       |                  | X    | y   | x      | y   | x    | y   |
|       |                  | 271  | 270 | 285    | 293 | 313  | 329 |
| 1     | 0-5              | 280  | 285 | 294    | 308 | 319  | 340 |
| 2     | 6-10             | 276  | 280 | 290    | 303 | 315  | 335 |
| 3     | 11-20            | 272  | 275 | 286    | 298 | 311  | 330 |
| 4     | 21-30            | 269  | 272 | 283    | 295 | 308  | 327 |
| 5     | 31-40            | 267  | 268 | 281    | 291 | 306  | 323 |
| 6     | 41-50            | 266  | 265 | 280    | 288 | 305  | 320 |
| 7     | 51-80            | 265  | 263 | 279    | 286 | 304  | 318 |
| 8     | 81-119           | 264  | 261 | 278    | 284 | 303  | 316 |
| 9     | Over 120         | 264  | 260 | 278    | 283 | 303  | 315 |

#### (5) Gumi winter table(Jan, Feb) - Gumi producing model use only (Normal line)

| NC4.0 | Aging time (Min) | Cool |     | Medium |     | Warm |     |
|-------|------------------|------|-----|--------|-----|------|-----|
|       |                  | X    | y   | x      | y   | x    | y   |
|       |                  | 271  | 270 | 285    | 293 | 313  | 329 |
| 1     | 0-2              | 283  | 292 | 297    | 315 | 322  | 347 |
| 2     | 3-5              | 282  | 290 | 296    | 313 | 321  | 345 |
| 3     | 6-9              | 280  | 288 | 294    | 311 | 319  | 343 |
| 4     | 10-19            | 277  | 284 | 291    | 307 | 316  | 339 |
| 5     | 20-35            | 275  | 279 | 289    | 302 | 314  | 334 |
| 6     | 36-49            | 274  | 275 | 288    | 298 | 313  | 330 |
| 7     | 50-79            | 273  | 272 | 287    | 295 | 312  | 327 |
| 8     | 80-119           | 272  | 271 | 286    | 294 | 311  | 326 |
| 9     | Over 120         | 271  | 270 | 285    | 293 | 310  | 325 |

#### (aging chamber)

| NC4.0 | Aging time (Min) | Cool |     | Medium |     | Warm |     |
|-------|------------------|------|-----|--------|-----|------|-----|
|       |                  | X    | y   | x      | y   | x    | y   |
|       |                  | 271  | 270 | 285    | 293 | 313  | 329 |
| 1     | 0-5              | 280  | 285 | 294    | 308 | 319  | 340 |
| 2     | 6-10             | 276  | 280 | 290    | 303 | 315  | 335 |
| 3     | 11-20            | 272  | 275 | 286    | 298 | 311  | 330 |
| 4     | 21-30            | 269  | 272 | 283    | 295 | 308  | 327 |
| 5     | 31-40            | 267  | 268 | 281    | 291 | 306  | 323 |
| 6     | 41-50            | 266  | 265 | 280    | 288 | 305  | 320 |
| 7     | 51-80            | 265  | 263 | 279    | 286 | 304  | 318 |
| 8     | 81-119           | 264  | 261 | 278    | 284 | 303  | 316 |
| 9     | Over 120         | 264  | 260 | 278    | 283 | 303  | 315 |

#### 4.3. Local Dimming Function Check

- Step 1) Turn on TV.
- Step 2) Press "TILT" key on the Adj. R/C
- Step 3) At the Local Dimming mode, module Edge Backlight moving left to right. Back light of IOP module moving
- Step 4) confirm the Local Dimming mode.
- Step 5) Press "exit" key.



Local Dimming Demo.  
(Edge LED Model)

#### 4.4. Magic Motion Remote control test

- (1) Equipment : RF Remote control for test, IR-KEY-Code Remote control for test
- (2) You must confirm the battery power of RF-Remote control before test(recommend that change the battery per every lot)
- (3) Sequence (test)
  - 1) if you select the "Start(Mute)" key on the Adjustment remote control, you can pairing with the TV SET.
  - 2) You can check the cursor on the TV Screen, when select the "OK" key on the Adjustment remote control.
  - 3) You must remove the pairing with the TV Set by select "OK" key + "Mute" key on the Adjustment remote control for 5 seconds.

#### 4.5. 3D function test

(Pattern Generator MSHG-600, MSPG-6100[Support HDMI1.4])  
\* HDMI mode NO. 872 , pattern No.83



- (1) Please input 3D test pattern like below.



- (2) When 3D OSD appear automatically, then select OK key.

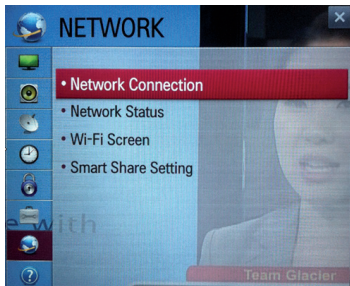


- (3) Don't wear a 3D Glasses, check the picture like below.

## 4.6. Wi-Fi Test

Step 1) Turn on TV

Step 2) Select Network Connection option in Network Menu.



Step 3) Select Start Connection button in Network Connection.



Step 4) If the system finds any AP like blow PIC, it is working well.



## 4.7. LNB voltage and 22KHz tone check

(only for DVB-S/S2 model)

▪ Test method

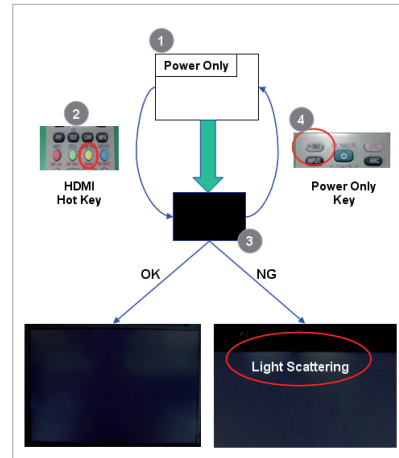
- (1) Set TV in Adj. mode using POWER ON.
- (2) Connect cable between satellite ANT and test JIG.
- (3) Press Yellow key(ETC+SWAP) in Adj Remote control to make LNB on.
- (4) Check LED light 'ON' at 18 V menu.
- (5) Check LED light 'ON' at 22 KHz tone menu.
- (6) Press Blue key(ETC+PIP INPUT) in Adjustment Remote control to make LNB off.
- (7) Check LED light 'OFF' at 18 V menu.
- (8) Check LED light 'OFF' at 22 KHz tone menu.

▪ Test result

- (1) After press LNB On key, '18 V LED' and '22 KHz tone LED' should be ON.
- (2) After press LNB OFF key, '18 V LED' and '22 KHz tone LED' should be OFF.

## 4.8. Inspection of light scattering

▪ Test Method



- (1) Push "Power only" key.
- (2) Push "HDMI" hot key.
- (3) Inspect whether light scattering is occurred in internal black pattern or not.
- (4) Push "Power only" key.

## 4.9. Option selection per country

### 4.9.1. Overview

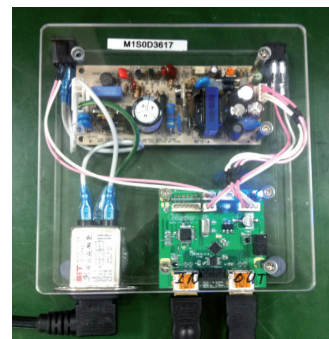
- Option selection is only done for models in Non-EU.

### 4.9.2. Method

- (1) Press ADJ key on the Adjustment Remote Control, then select Country Group Menu
- (2) Depending on destination, select Country Group Code 04 or Country Group EU then on the lower Country option, select US, CA, MX. Selection is done using +, - or ►◄ key.

## 4.10. MHL Test

- (1) Turn on TV
- (2) Select HDMI4 mode using input Menu.
- (3) Set MHL Zig(M1S0D3617) using MHL input, output and power cord.
- (4) Connect HDMI cable between MHL Zig and HDMI4 port.
- (5) Check LED light of Zig and Module of Set.



Result) If, the LED light is green and the Module shows normal stream → OK, Else → NG



#### 4.11. HDMI ARC Function Inspection

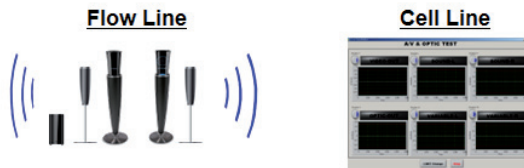
- (1) Test equipment
  - Optic Receiver Speaker
  - MSHG-600 (SW: 1220 ↑)
  - HDMI Cable (for 1.4 version)
- (2) Test method
  - 1) Insert the HDMI Cable to the HDMI ARC port from the master equipment (HDMI1)



- 2) Check the sound from the TV Set



- 3) Check the Sound from the Speaker or using AV & Optic TEST program (It's connected to MSHG-600)



- \* Remark: Inspect in Power Only Mode and check SW version in a master equipment



#### 4.12. Ship-out mode check(In-stop)

- After final inspection, press "IN-STOP" key of the Adjustment remote control and check that the unit goes to Stand-by mode.

#### 4.13. Tool Option selection

- Method: Press ADJ key on the Adj. R/C, then select Tool option.

#### 4.14. GND and Internal Pressure check

##### 4.14.1. Method

- (1) GND & Internal Pressure auto-check preparation
  - Check that Power cord is fully inserted to the SET.  
(If loose, re-insert)
- (2) Perform GND & Internal Pressure auto-check
  - Unit fully inserted Power cord, Antenna cable and A/V arrive to the auto-check process.
  - Connect D-terminal to AV JACK TESTER
  - Auto CONTROLLER(GWS103-4) ON
  - Perform GND TEST
  - If NG, Buzzer will sound to inform the operator.
  - If OK, changeover to I/P check automatically.  
(Remove CORD, A/V form AV JACK BOX.)
  - Perform I/P test
  - If NG, Buzzer will sound to inform the operator.
  - If OK, Good lamp will lit up and the stopper will allow the pallet to move on to next process.

##### 4.14.2. Checkpoint

- TEST voltage
  - GND: 1.5 KV / min at 100 mA
  - SIGNAL: 3 KV / min at 100 mA
- TEST time: 1 second
- TEST POINT
  - GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
  - Internal Pressure TEST = POWER CORD GND & LIVE & NEUTRAL
- LEAKAGE CURRENT: At 0.5 mArms

#### 5. Audio

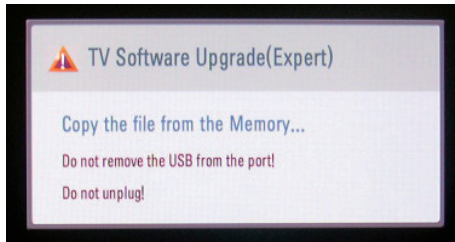
| No. | Item                                                        | Min | Typ  | Max  | Unit | Remark                                                                          |
|-----|-------------------------------------------------------------|-----|------|------|------|---------------------------------------------------------------------------------|
| 1.  | Audio practical max Output, L/R (Distortion=10% max Output) | 9.0 | 10.0 | 12.0 | W    | Measurement condition                                                           |
|     |                                                             | 8.5 | 8.9  | 9.8  | Vrms | Auto Volume :Off<br>Audio EQ : Off<br>Clear Voice : Off<br>Virtual Surround:Off |
| 2.  | Speaker (8 $\Omega$ Impedance)                              |     | 10.0 | 15.0 | W    |                                                                                 |

Measurement condition:

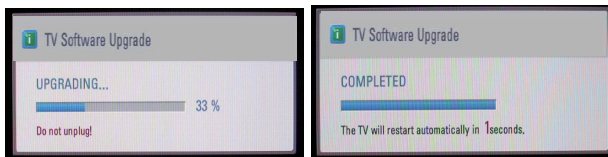
- (1) RF input: Mono, 1 KHz sine wave signal, 100 % Modulation
- (2) CVBS, Component: 1 KHz sine wave signal 0.5 Vrms
- (3) RGB PC: 1 KHz sine wave signal 0.7 Vrms

## 6. USB S/W Download(Service only)

- (1) Put the USB Stick to the USB socket.
- (2) Automatically detecting update file in USB Stick.
  - If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting.(Download Version High & Power only mode, Set is automatically Download)
- (3) Show the message "Copying files from memory".



- (4) Updating is starting.

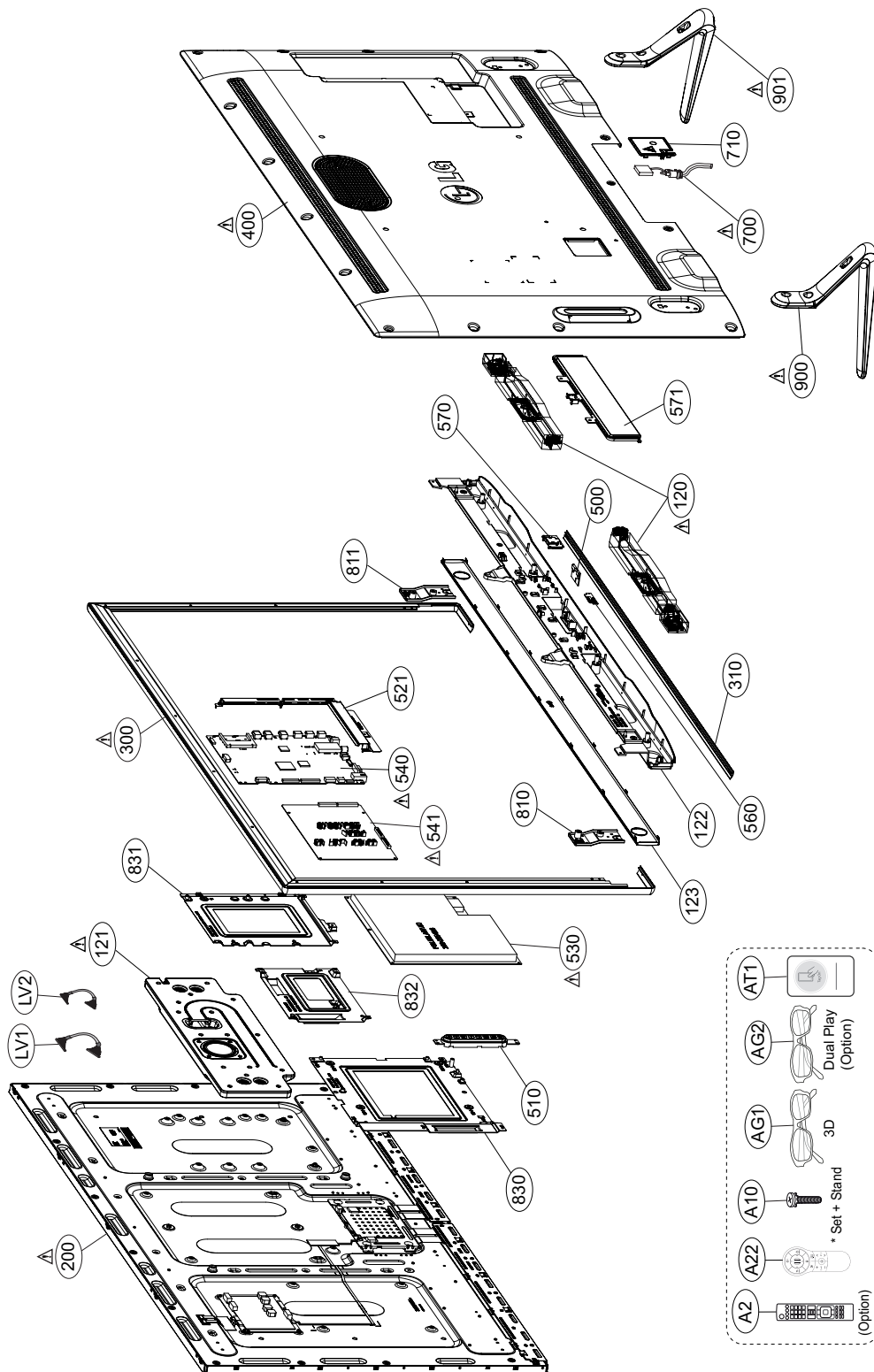


- (5) Updating Completed, The TV will restart automatically.
  - (6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
- \* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ ATV test on production line.
- \* After downloading, have to adjust Tool Option again.
- (1) Push "IN-START" key in service remote control.
  - (2) Select "Tool Option 1" and push "OK" key.
  - (3) Punch in the number. (Each model has their number)

# EXPLODED VIEW

## IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\Delta$  in the Schematic Diagram and EXPLODED VIEW. It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards. Do not modify the original design without permission of manufacturer.



### Clock for LG1154D

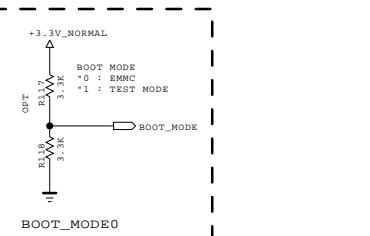
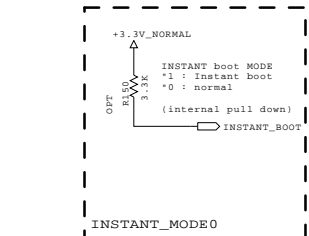
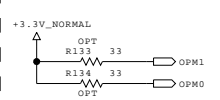
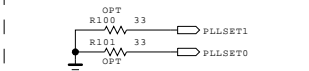
MAIN Clock (24MHz)

System Clock for Analog block (24MHz)

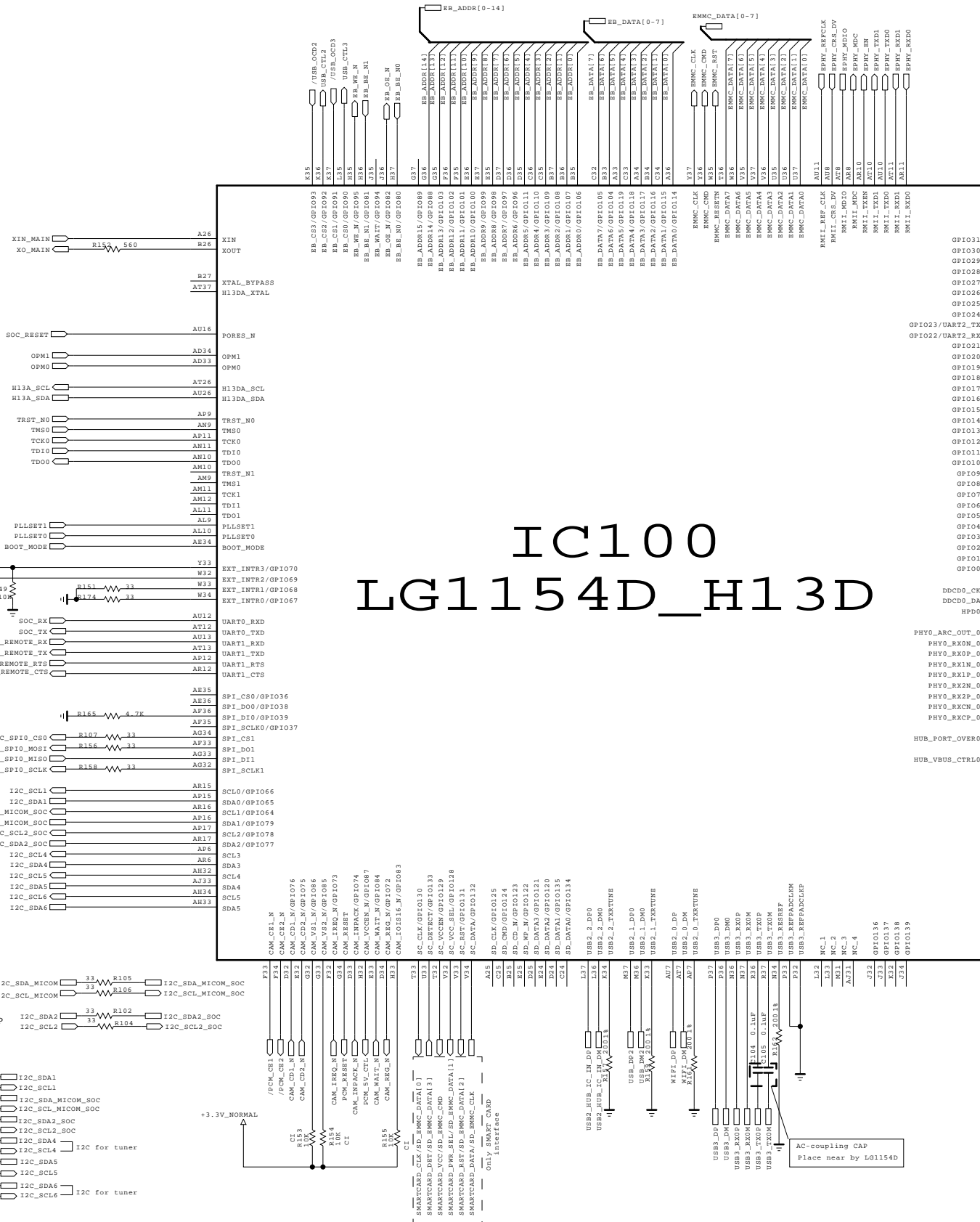
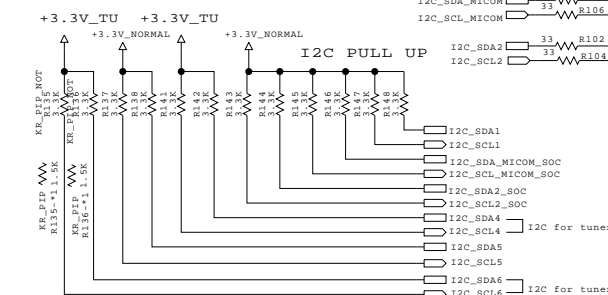
[illegible]

The diagram shows the R1EX2425BBSA0A IC with the following connections:

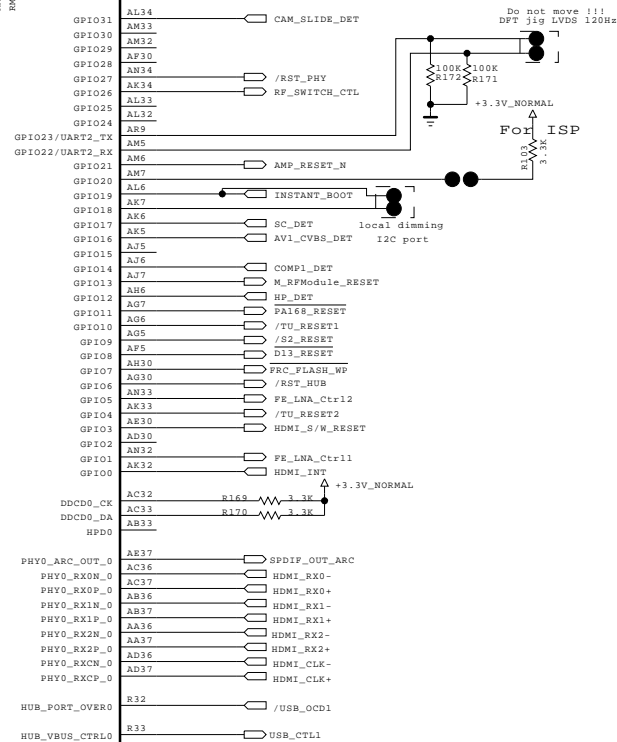
- Pin 1 (A0):** Connected to ground.
- Pin 2 (A1):** Connected to ground.
- Pin 3 (A2):** Connected to ground.
- Pin 4 (VSS):** Connected to ground.
- Pin 5 (SDA):** Connected to the I2C\_SDA pin through a 1k40 resistor.
- Pin 6 (SCL):** Connected to the I2C\_SCL pin through a 1k10 resistor.
- Pin 7 (WP):** Connected to ground.
- Pin 8 (VCC):** Connected to the positive supply rail.
- Capacitors:** A 0.1μF capacitor (C103) is connected between the VCC and ground pins.
- Legend:**
  - Low : Normal Operation
  - High : Write Protection

[illegible][illegible]

|              |            | HIGH    | LOW         |
|--------------|------------|---------|-------------|
| MODEL_OPT_0  | Area1      | Taiwan  | non Taiwan  |
| MODEL_OPT_1  | Reserved   |         | Default     |
| MODEL_OPT_2  | Panel      | PHD     | UD          |
| MODEL_OPT_3  | Reserved   |         | Default     |
| MODEL_OPT_4  | Module     | V13     | V12         |
| MODEL_OPT_5  | Reserved   |         | Default     |
| MODEL_OPT_6  | CP BOX     | Enable  | Disable     |
| MODEL_OPT_7  | T2 Tuner   | Support | Not Support |
| MODEL_OPT_8  | S Tuner    | Support | Not Support |
| MODEL_OPT_9  | Area2      | AJ_JA   | non AJ_JA   |
| MODEL_OPT_10 | D13(HRVCC) | Support | Not Support |



IC100  
LG1154D H13D



THE Δ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE Δ SYMBOL MARK OF THE SCHEMATIC.

SECRET  
G Electronics

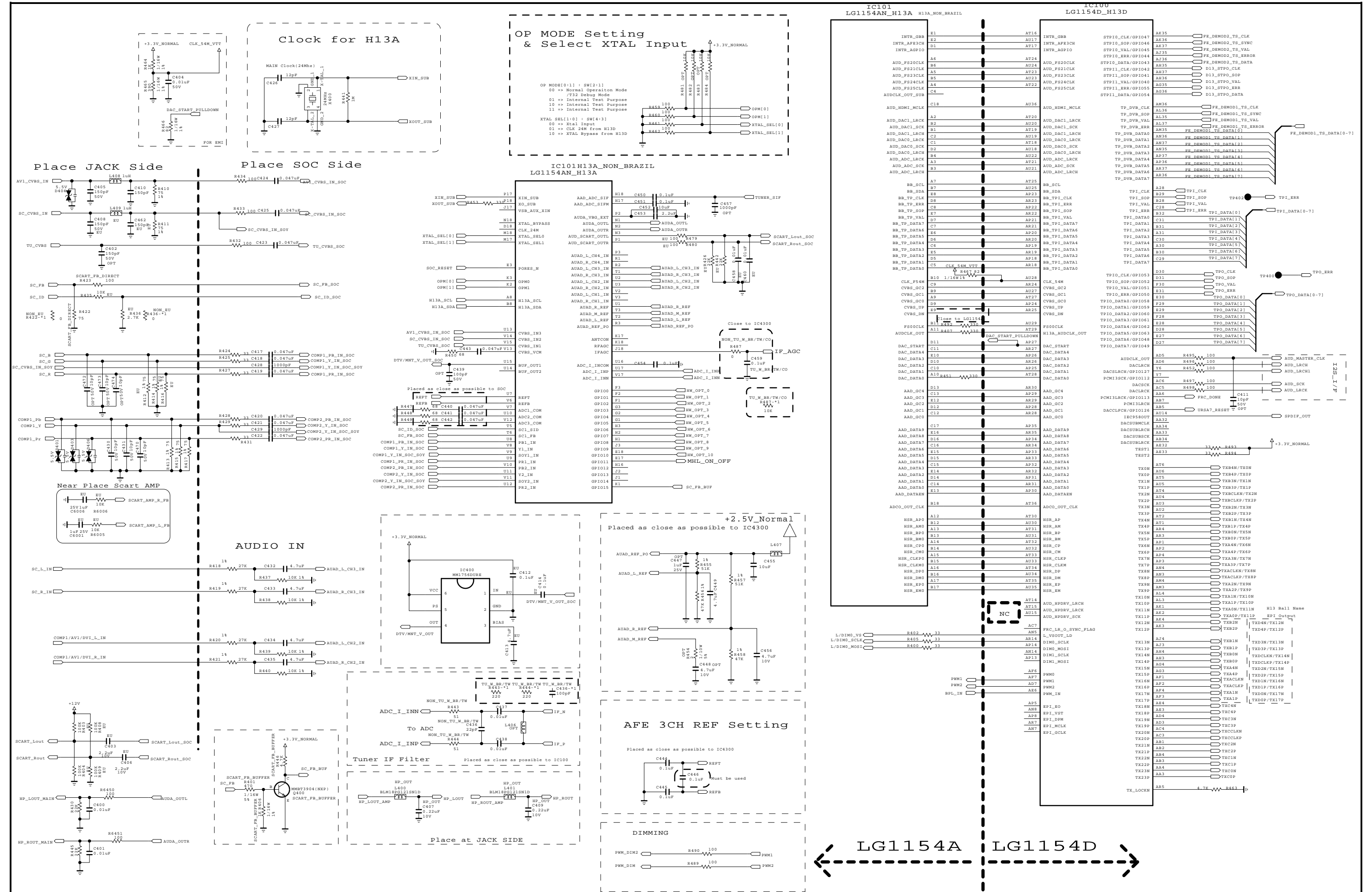




BSD-NC4\_H001-HD

|       |            |       |            |
|-------|------------|-------|------------|
| MODEL |            | DATE  | 2012-11-14 |
| BLOCK | H13 D CHIP | SHEET | /          |

IC101  
LG1154AN H13A





THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILTRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics

 LG ELECTRONICS

MODEL  
BLOCK

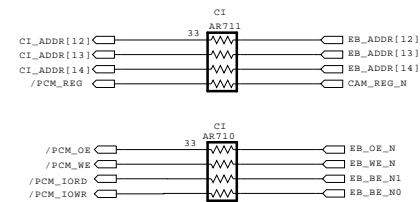
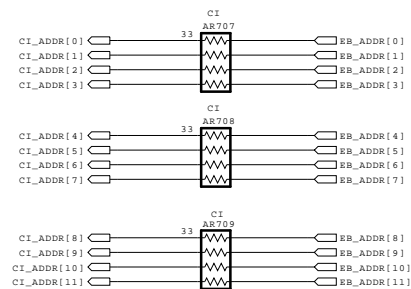
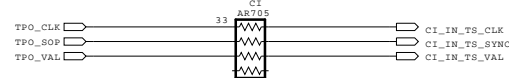
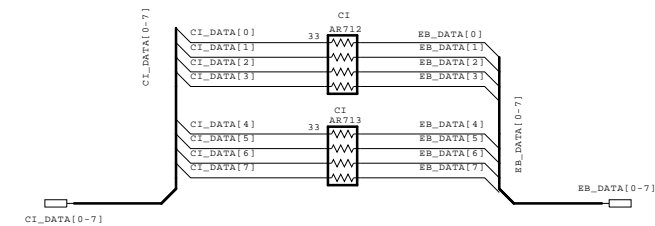
MAIN AUDIO/VIDEO

DATE  
SHEET

2012-11-13

BSD-NC4\_H004-HD





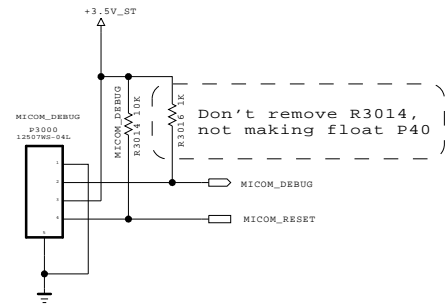
SECRET  
LGElectronics



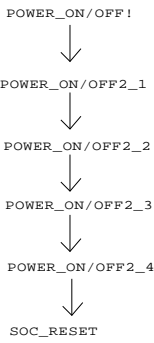




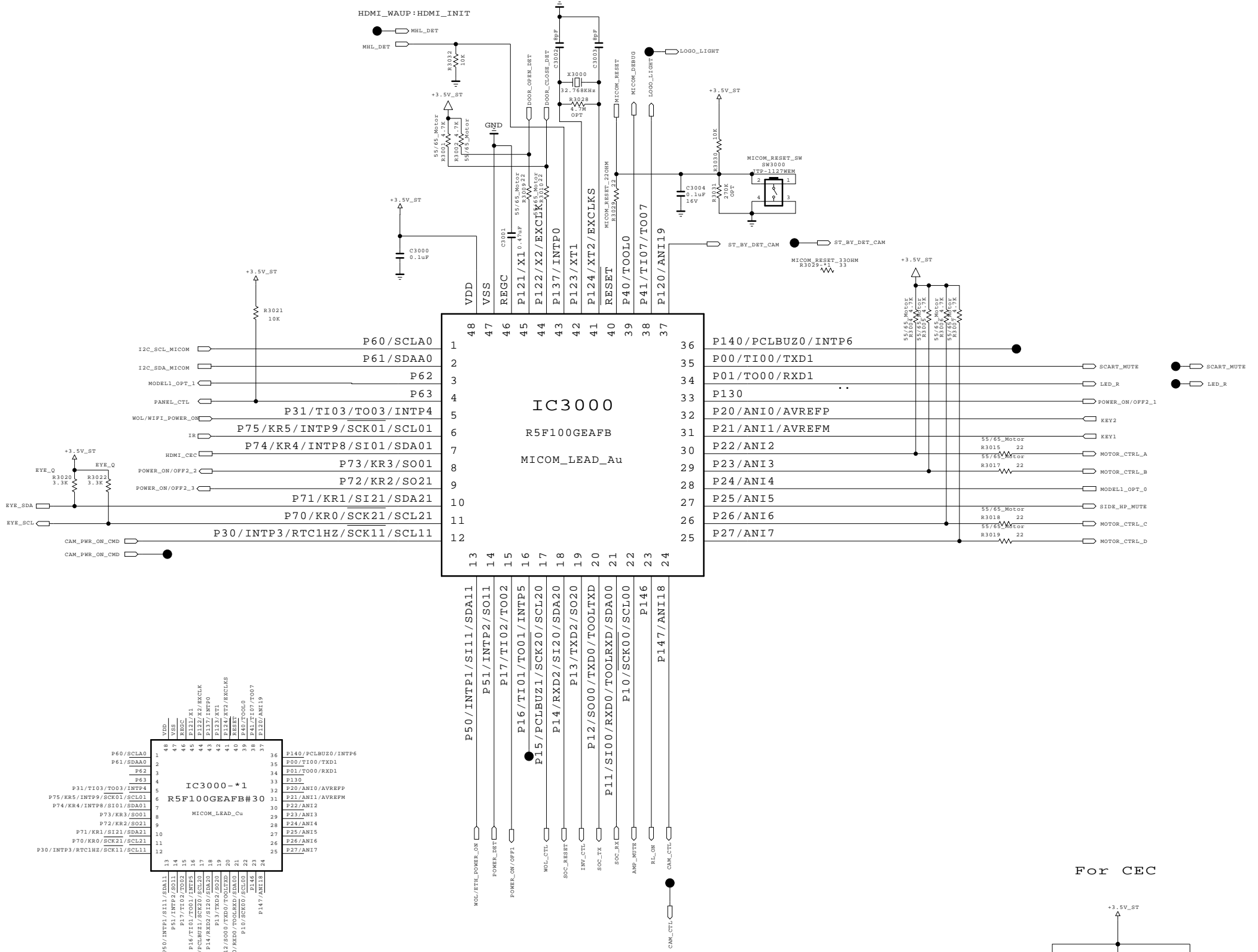
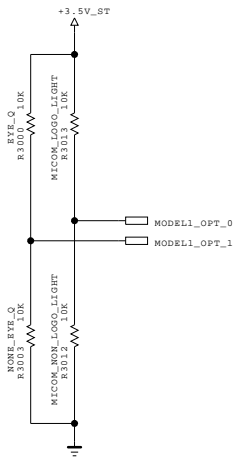
For Debug



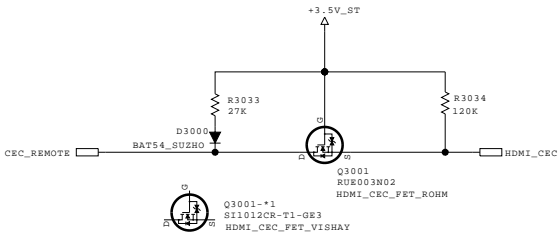
GP4 High/MID Power SEQUENCE



MICOM MODEL OPTION



For CEC



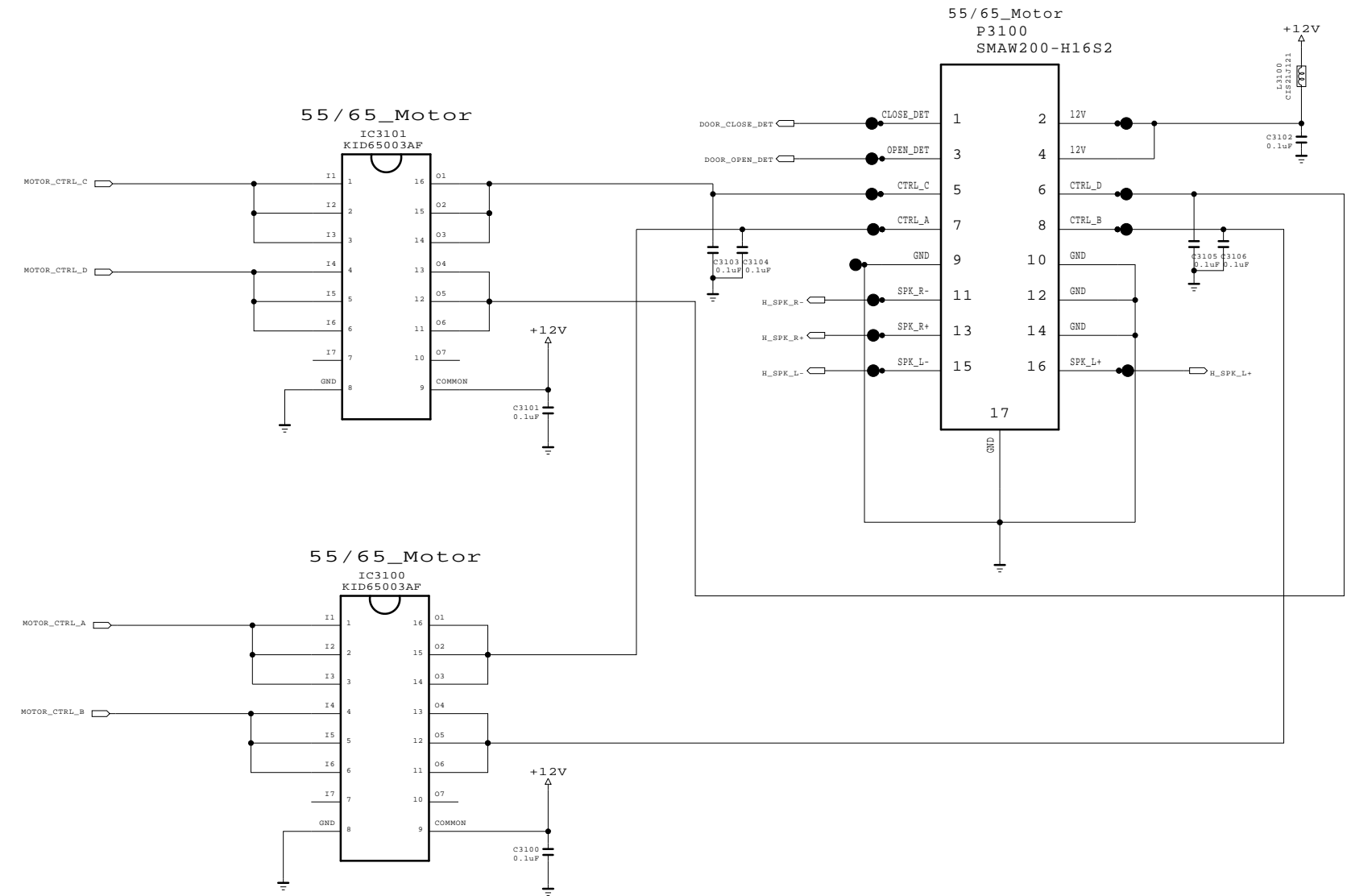
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.



SECRET  
LGElectronics

LG ELECTRONICS

|       |       |       |            |
|-------|-------|-------|------------|
| MODEL |       | DATE  | 2012.02.22 |
| BLOCK | MICOM | SHEET | 30         |

DOOR MOTOR Sheet option : 55/65\_Motor

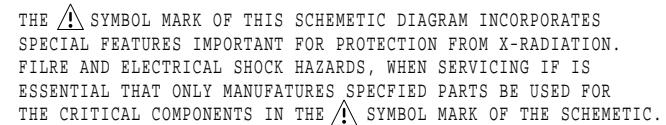
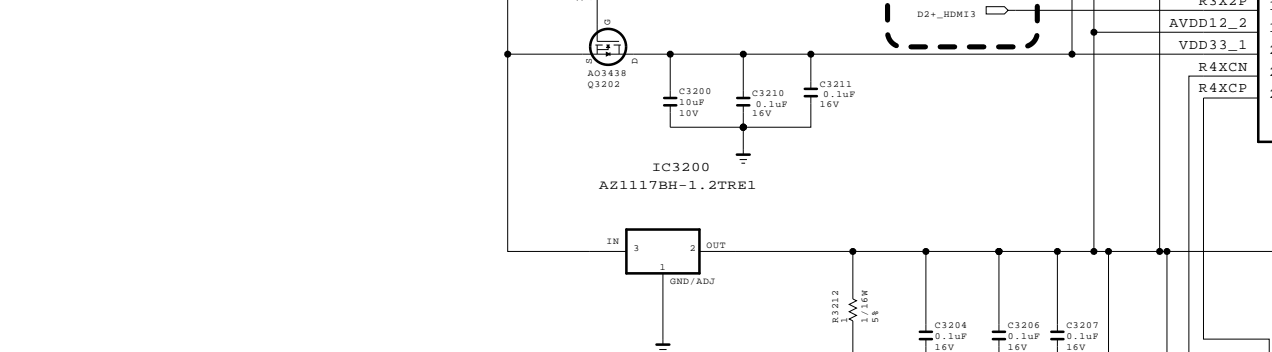
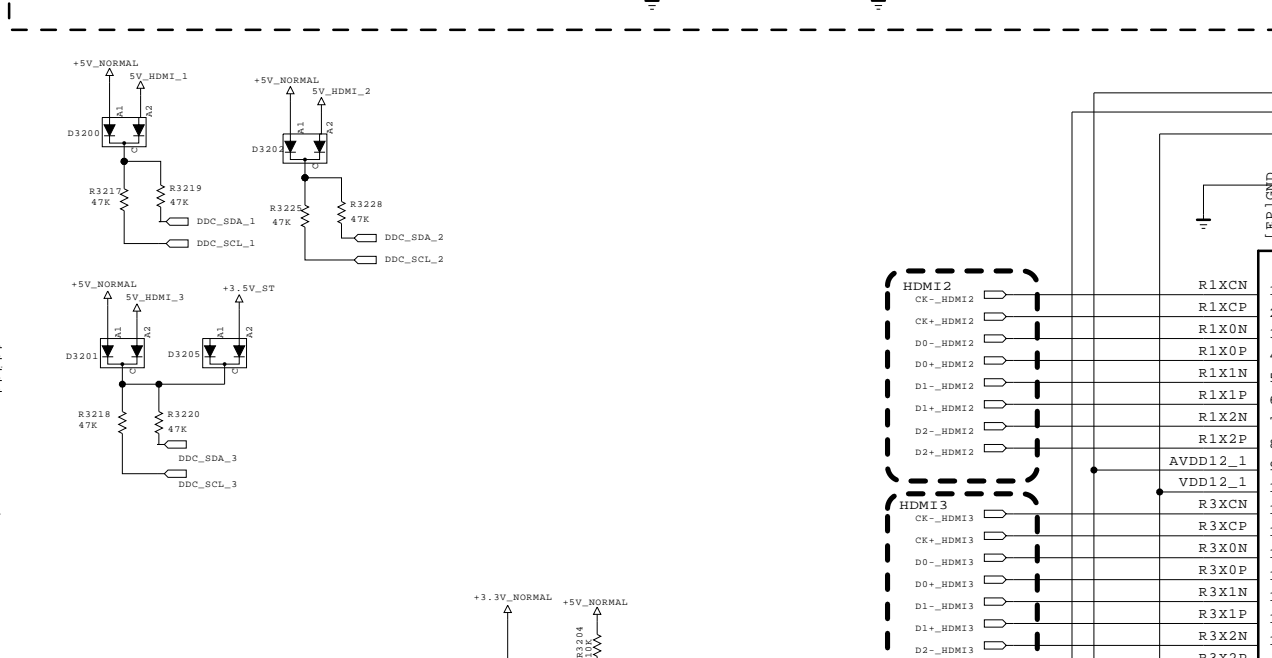
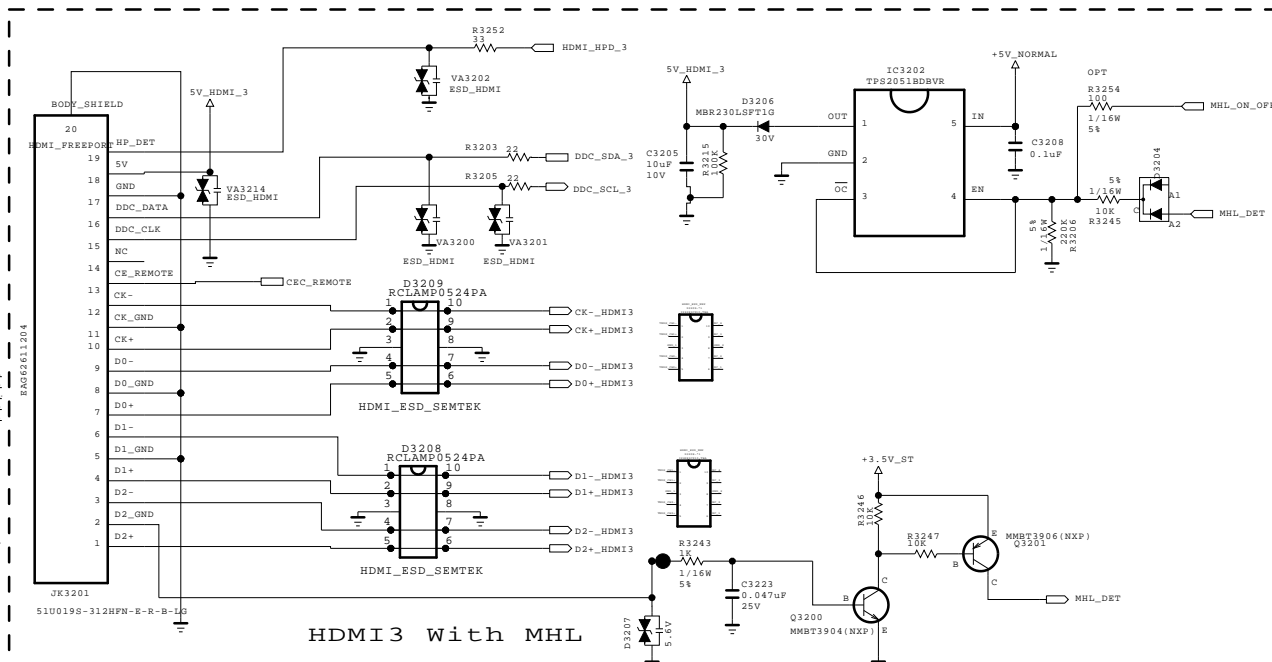


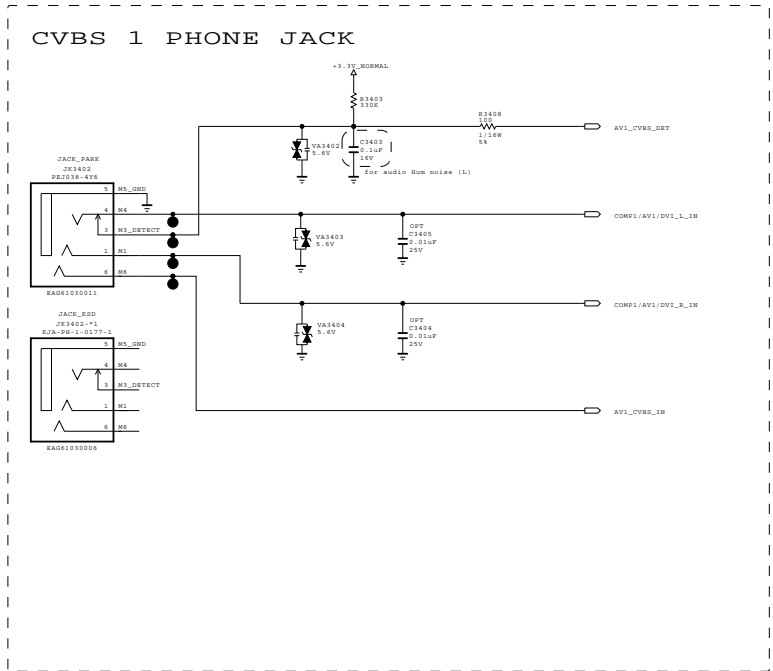
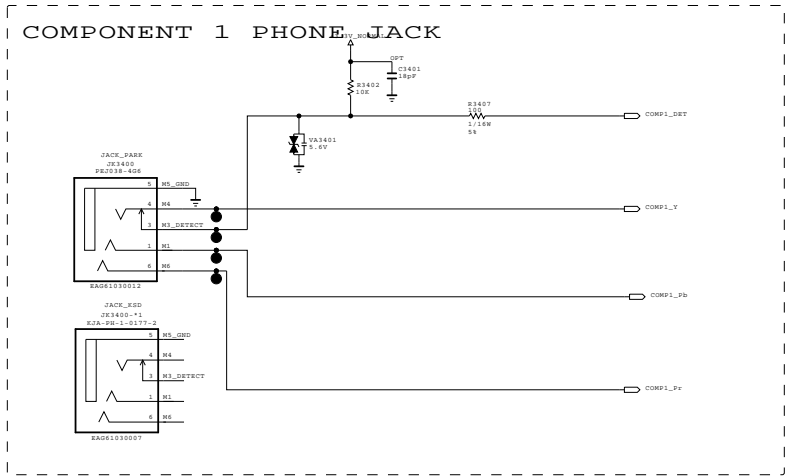
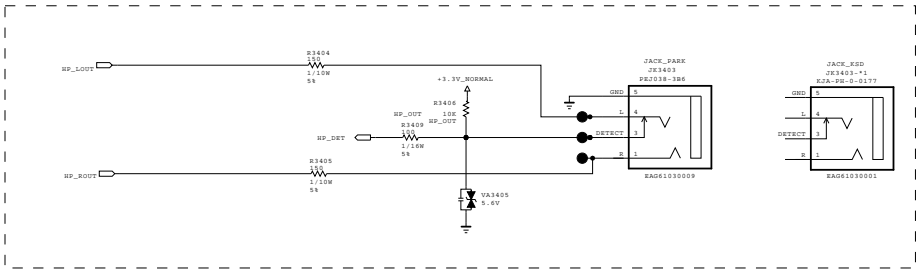
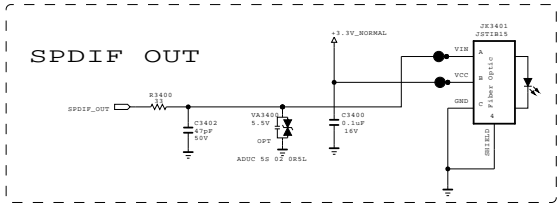
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics



|       |       |       |      |
|-------|-------|-------|------|
| MODEL | GP4   | DATE  |      |
| BLOCK | Motor | SHEET | 31 / |



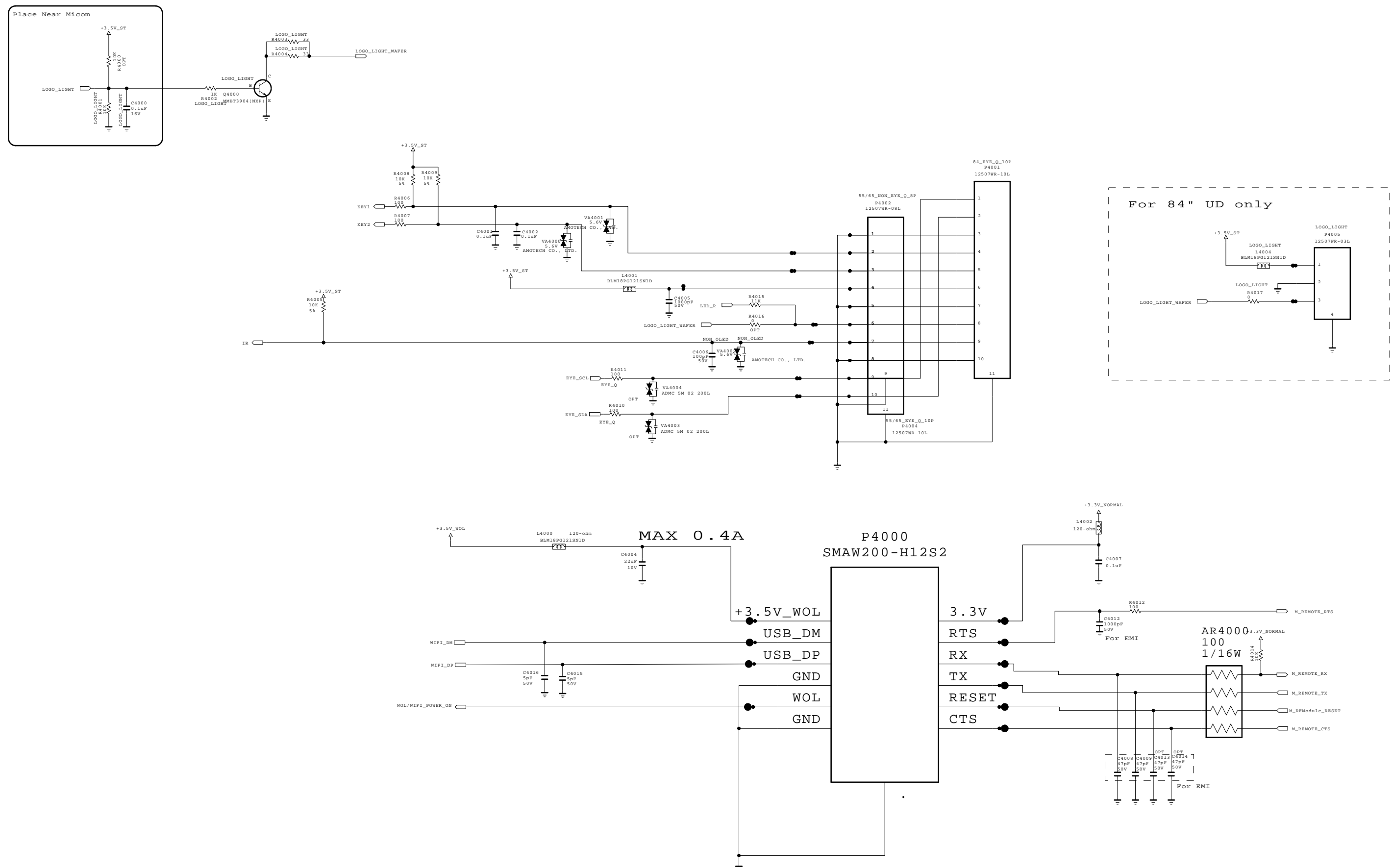


THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics

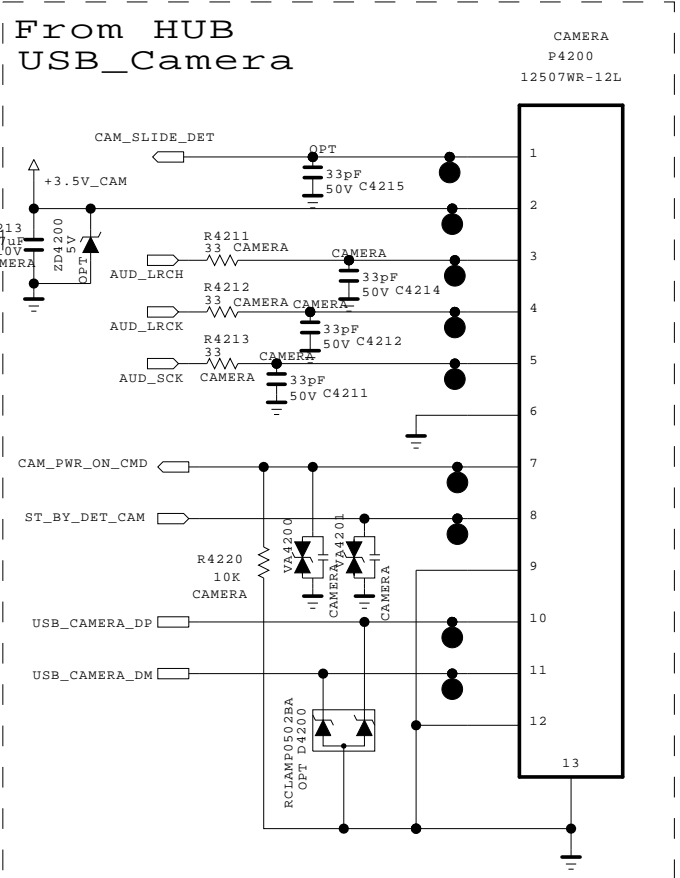
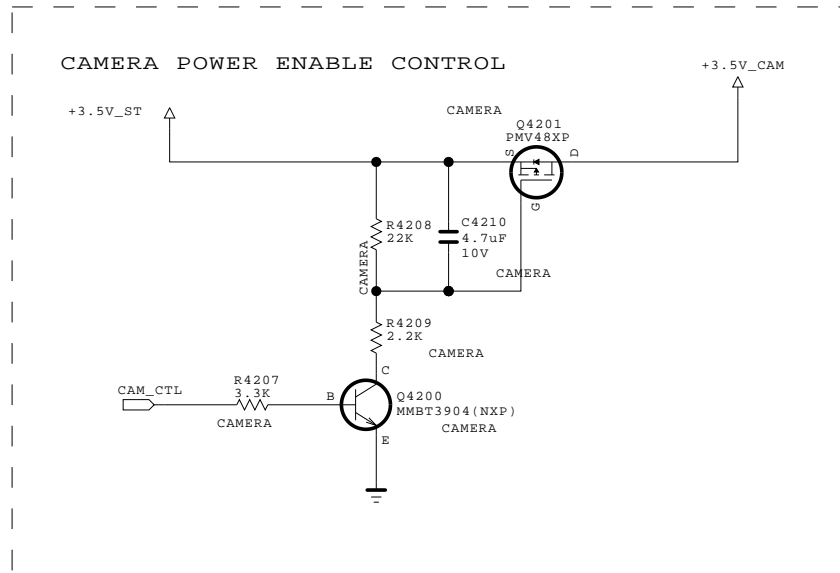
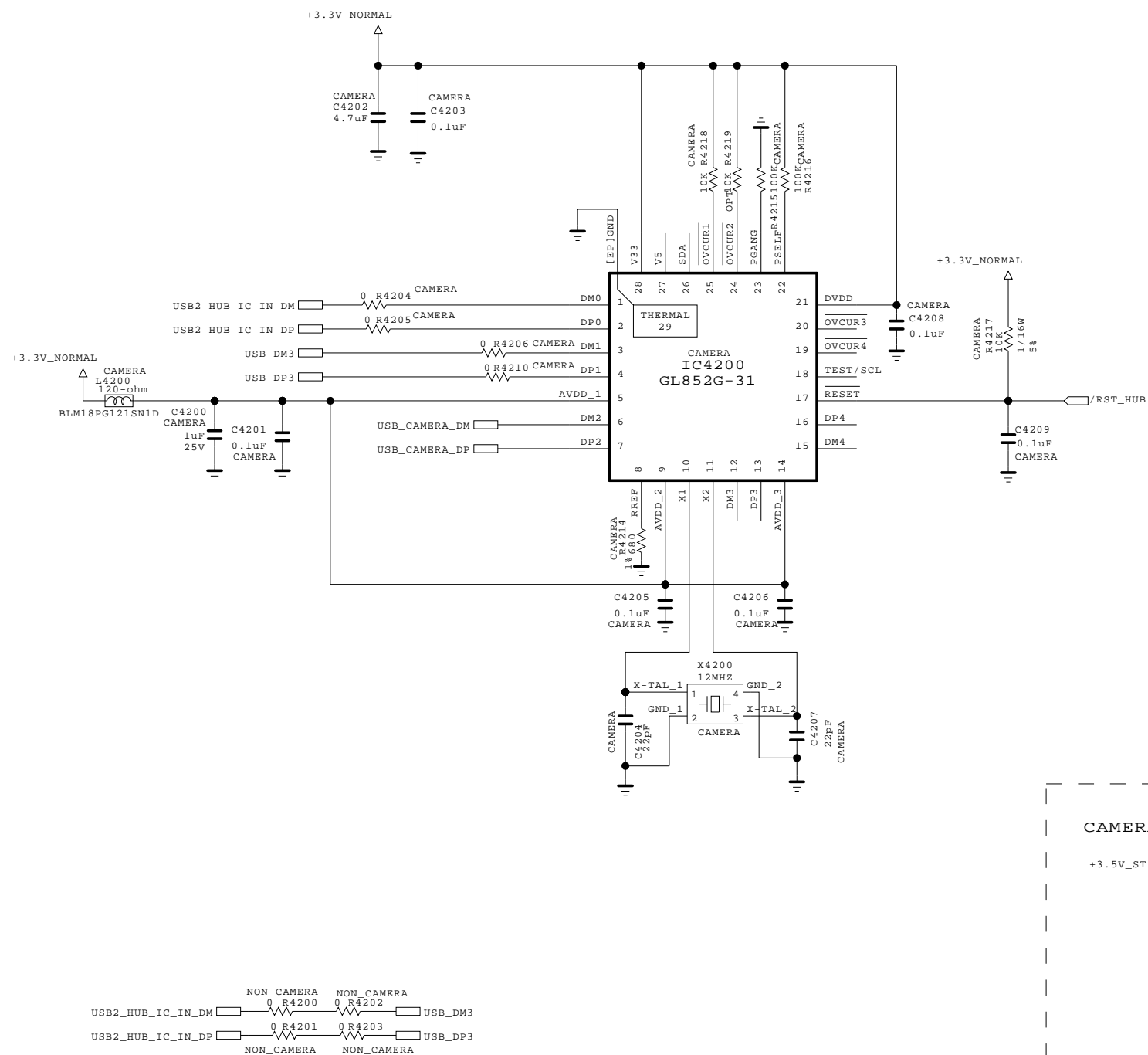
LG ELECTRONICS



|               |  |            |  |
|---------------|--|------------|--|
| MODEL         |  |            |  |
| BLOCK         |  | SHEET      |  |
| JACK HIGH/MID |  | DATE       |  |
|               |  | 2012.10.09 |  |



SECRET  
G Electronics

BSD-NC4\_H040-HD



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

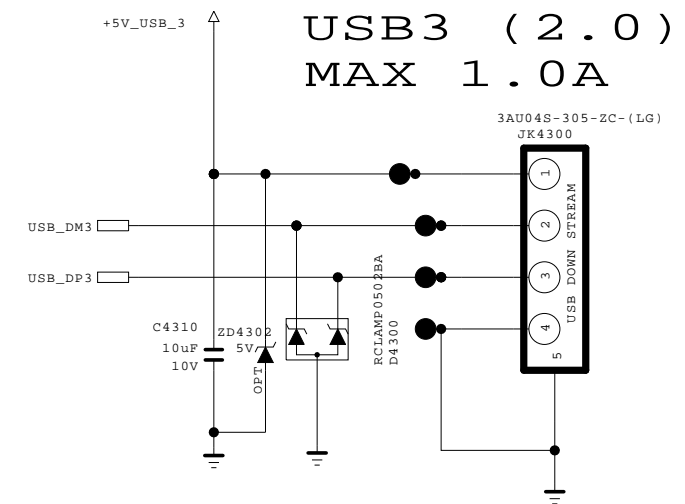
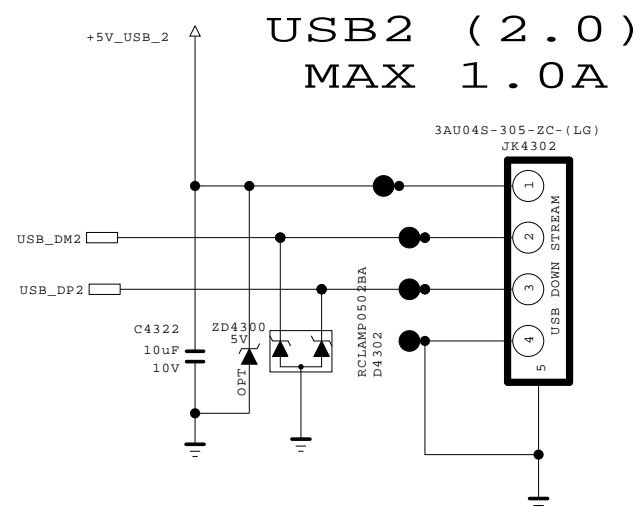
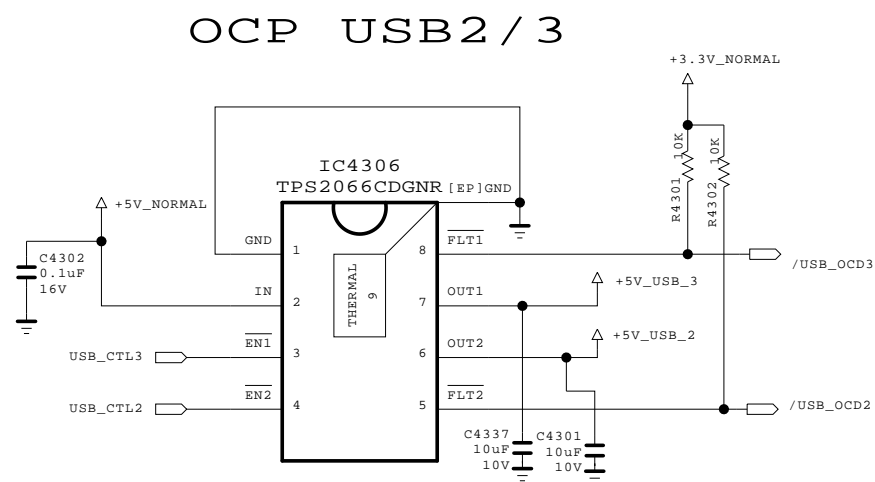
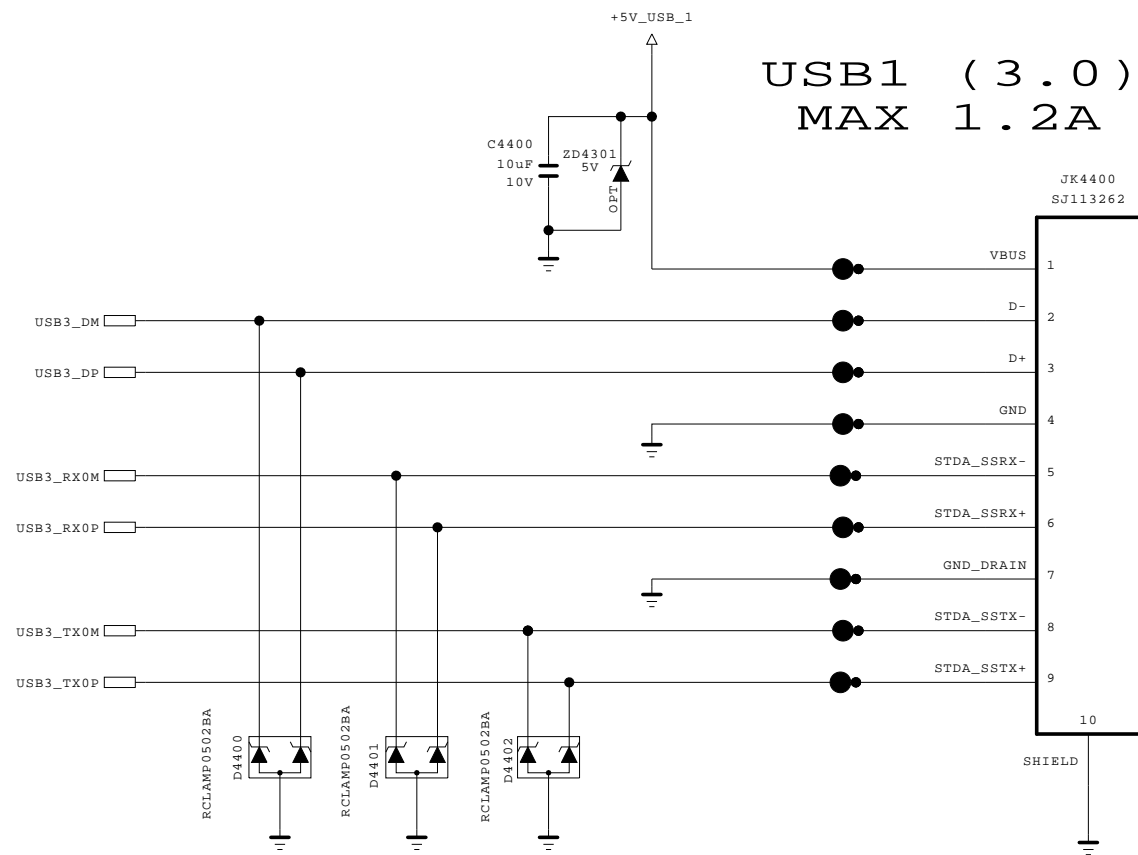
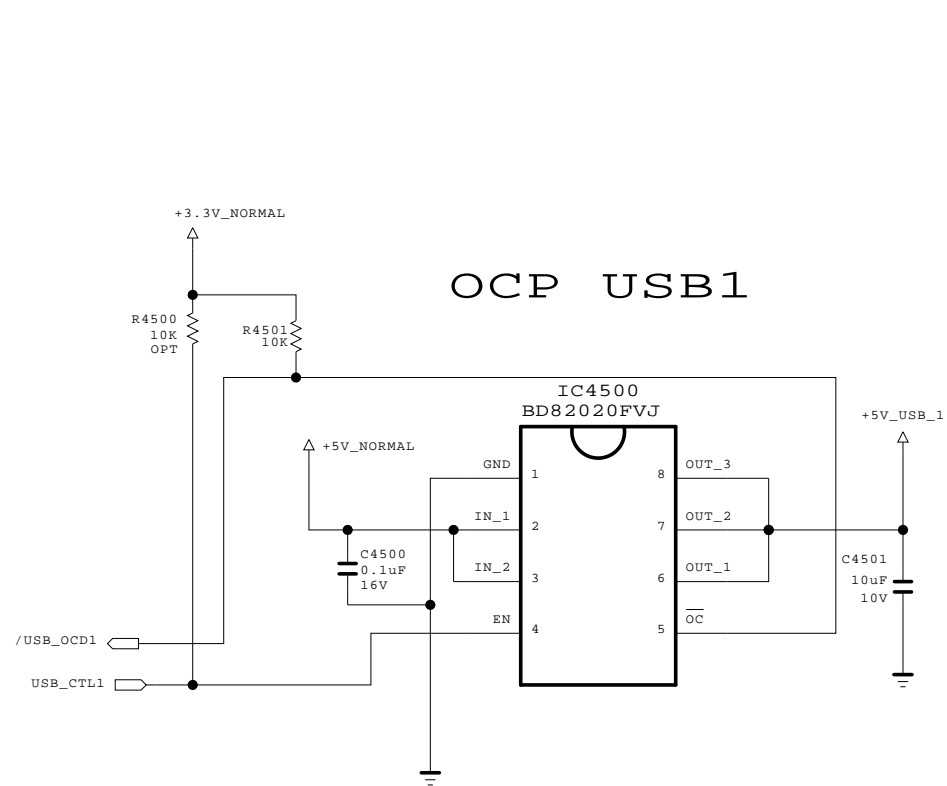
SECRET



LGElectronics



LG ELECTRONICS

|                 |          |       |            |
|-----------------|----------|-------|------------|
| BSD-NC4_H042-HD |          |       |            |
| MODEL           | USB3_HUB | DATE  | 2012.10.08 |
| BLOCK           |          | SHEET | /          |



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

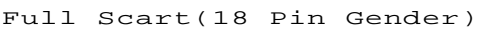
SECRET

LGElectronics

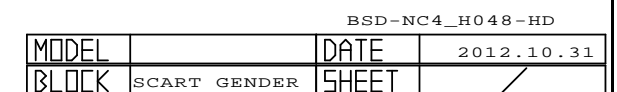
 LG ELECTRONICS

|                 |          |       |            |
|-----------------|----------|-------|------------|
| BSD-NC4_H044-HD |          |       |            |
| MODEL           |          | DATE  | 2012-11-09 |
| BLOCK           | USB JACK | SHEET | /          |

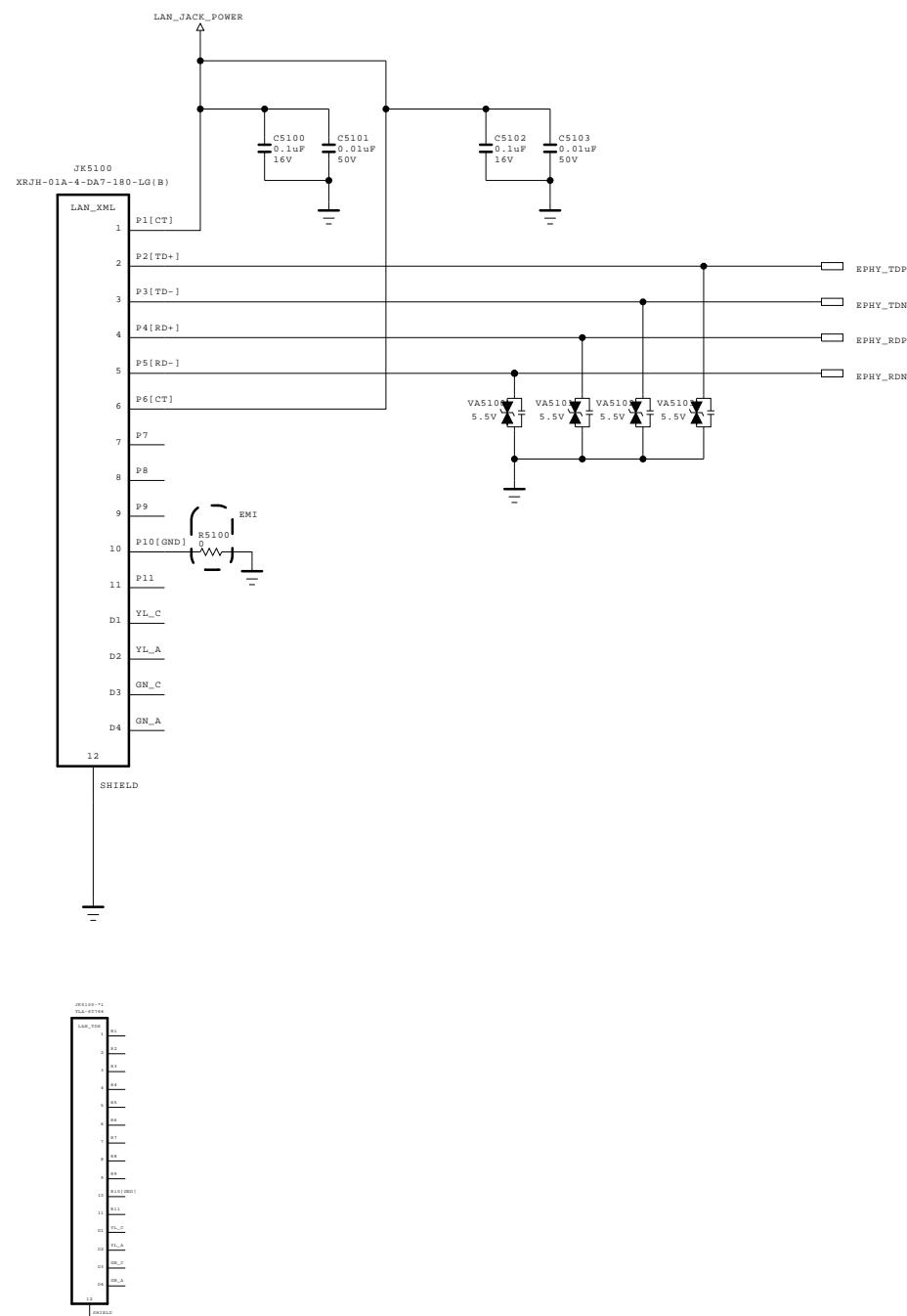






SECRET  
LGElectronics



# Ethernet Block



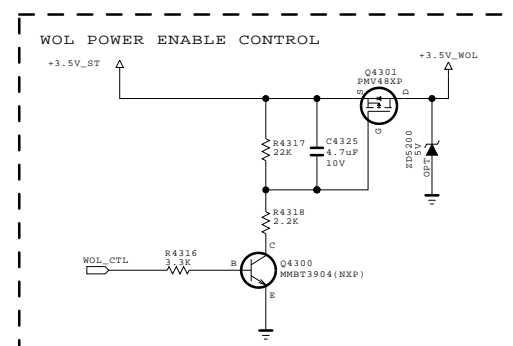
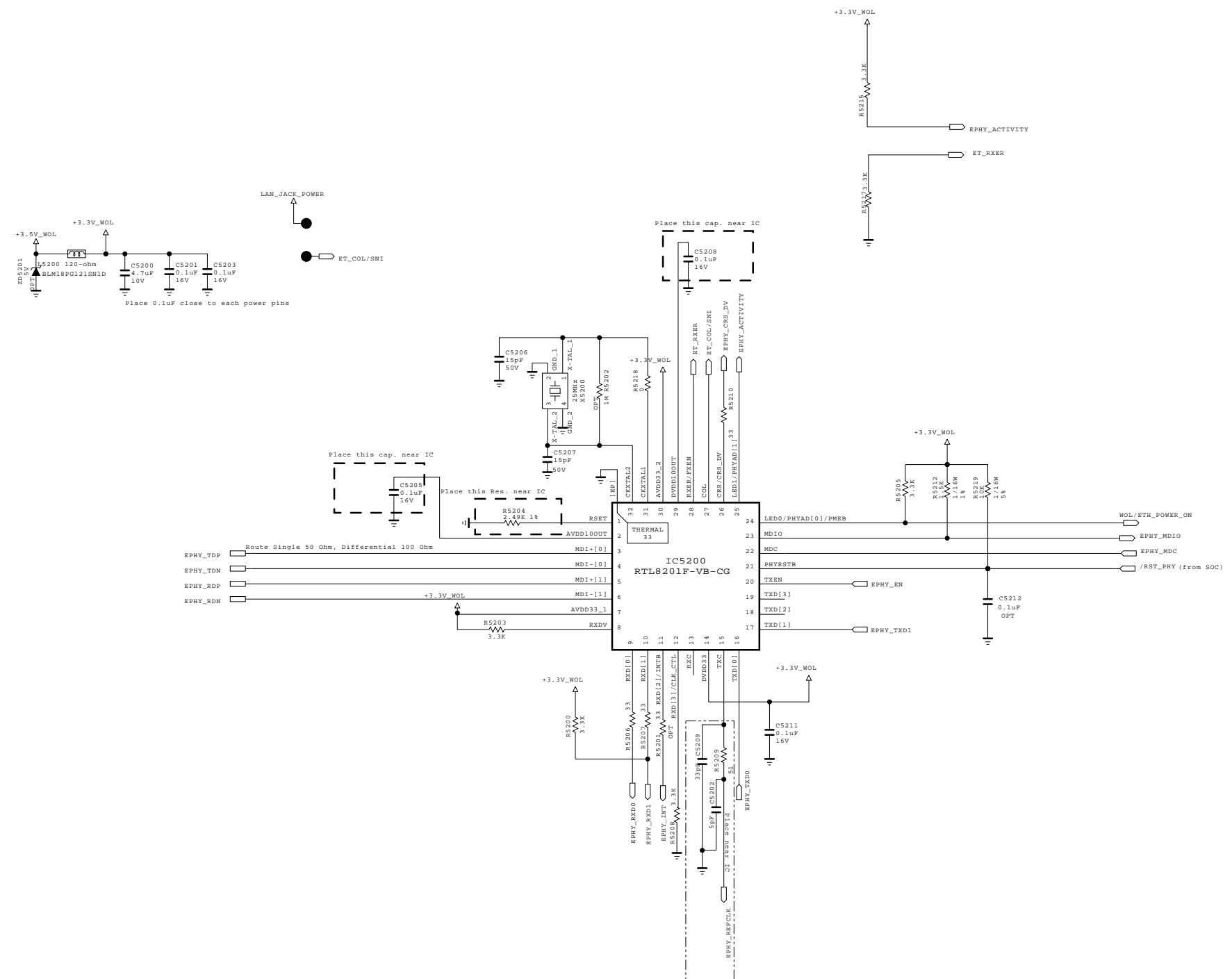
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics



|       |              |       |            |
|-------|--------------|-------|------------|
| MODEL | LAN_VERTICAL | DATE  | 2011.12.09 |
| BLOCK |              | SHEET | 50 /       |

# Ethernet Block



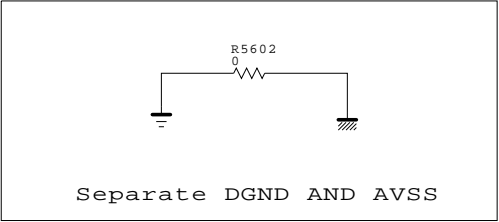
THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics

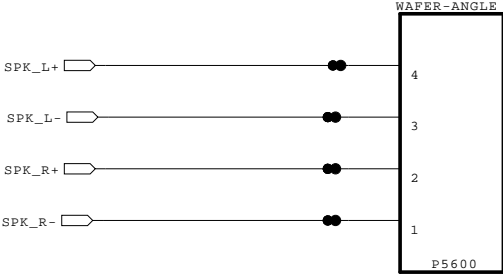
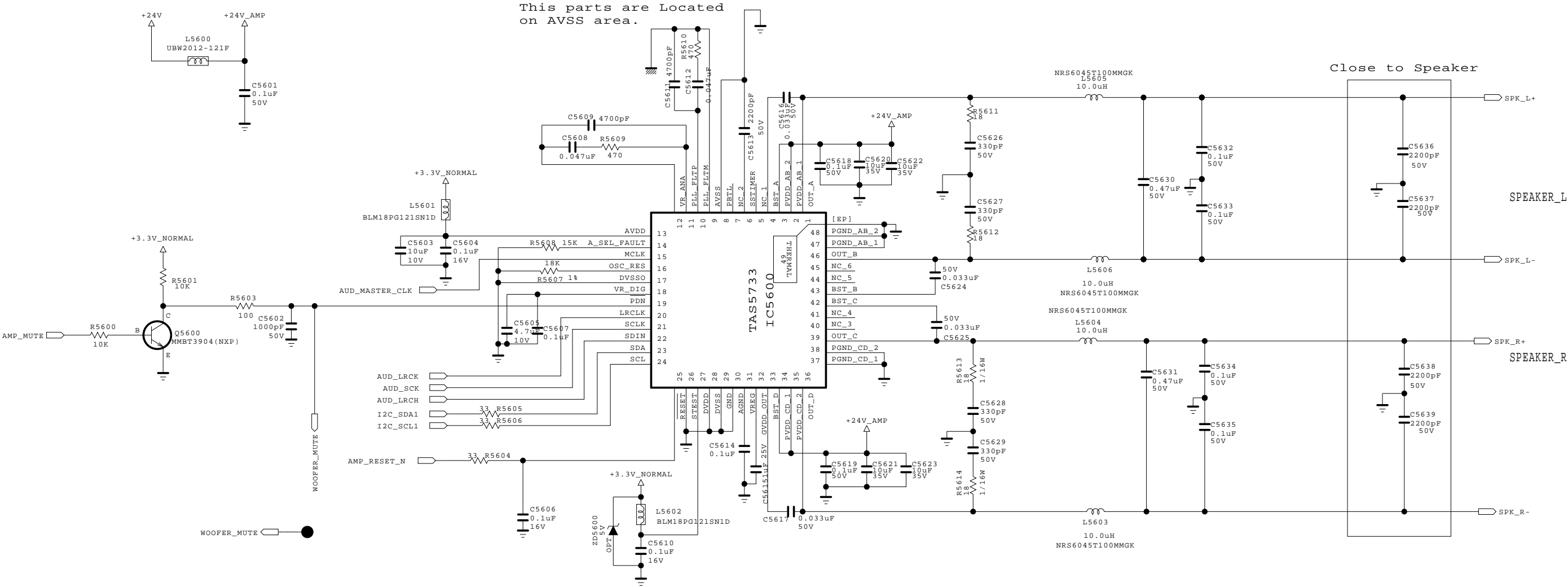




BSD-NC4\_H052-HD

|       |          |       |            |
|-------|----------|-------|------------|
| MODEL |          | DATE  | 2012-09-12 |
| BLOCK | ETHERNET | SHEET | /          |



This parts are Located on AVSS area.



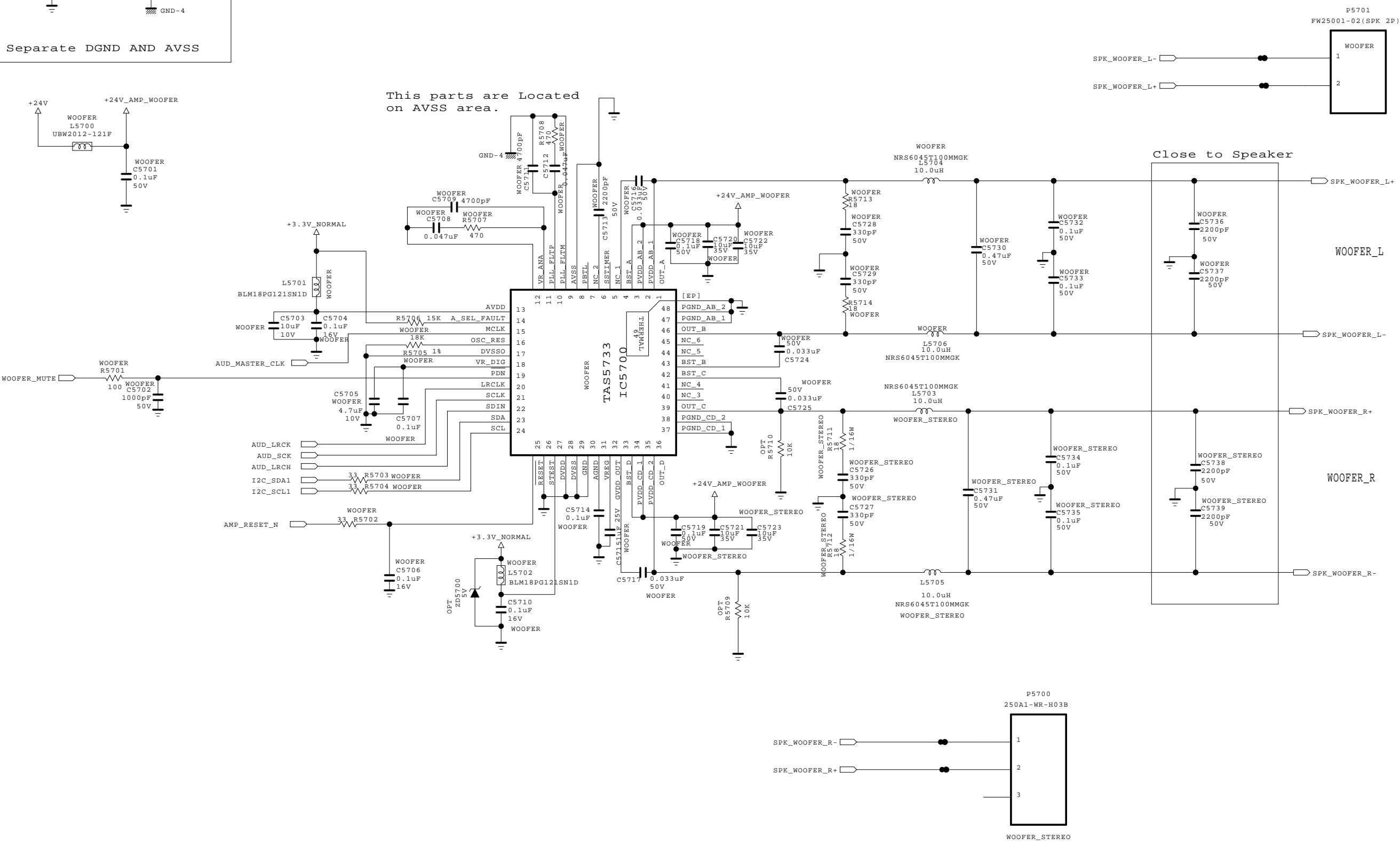
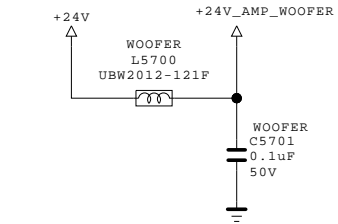
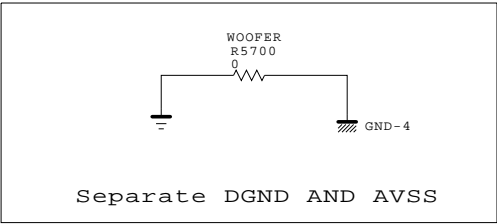
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET

LGElectronics

 LG ELECTRONICS

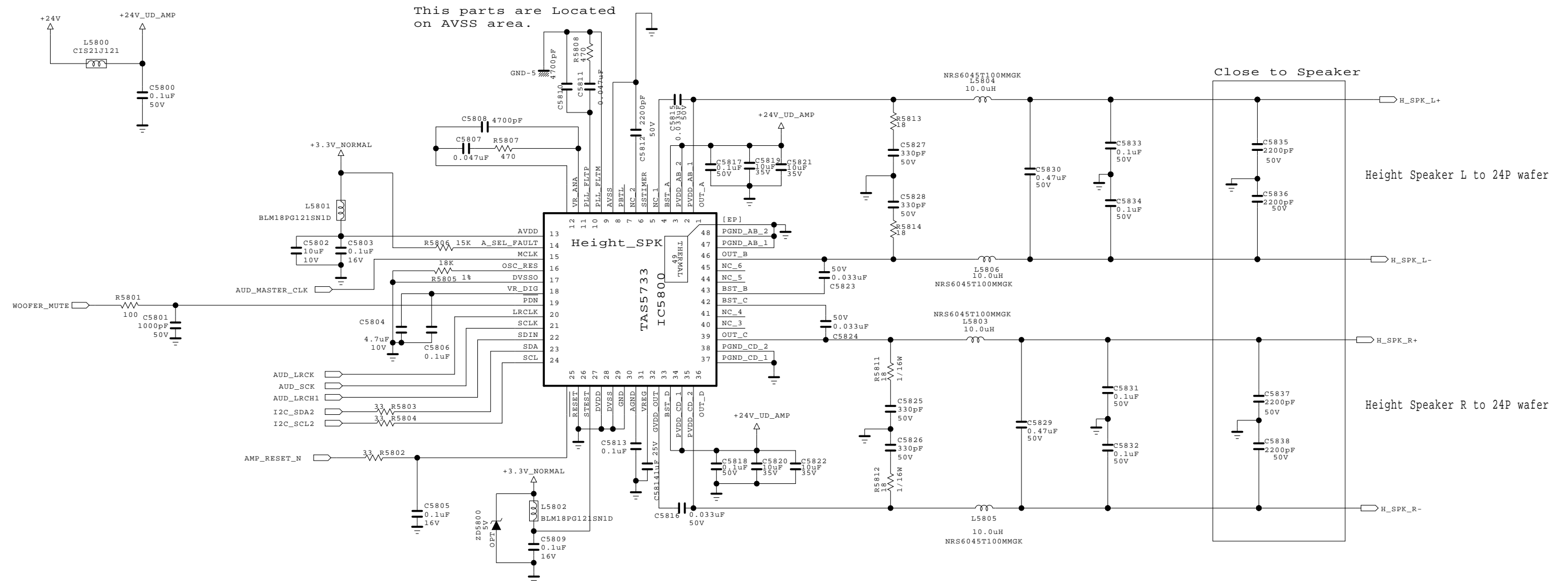
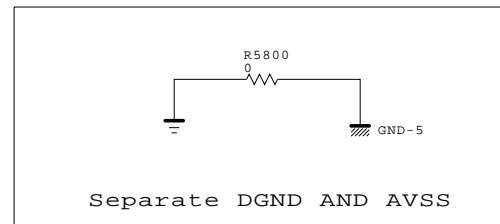
|       |            |       |            |
|-------|------------|-------|------------|
| MODEL | GP4_MT5369 | DATE  | 2011.11.21 |
| BLOCK | AUDIO[ST]  | SHEET | 58 /       |



THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

|               |                |       |            |       |            |
|---------------|----------------|-------|------------|-------|------------|
| SECRET        | LG ELECTRONICS | MODEL | GP4_MT5369 | DATE  | 2011.11.21 |
| LGElectronics |                | BLOCK | AUDIO[ST]  | SHEET | 58         |

# Height\_SPK option

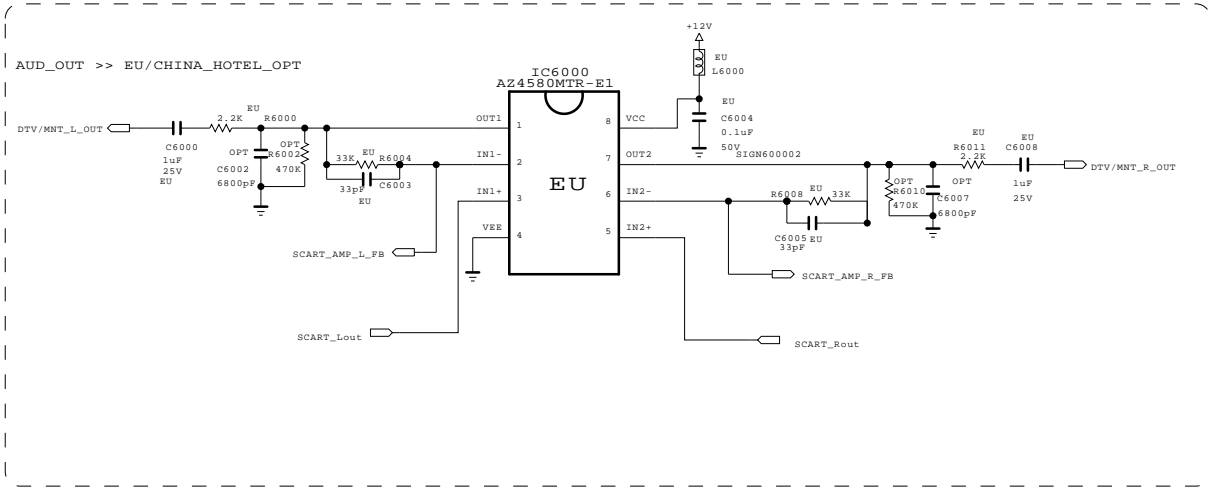


THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

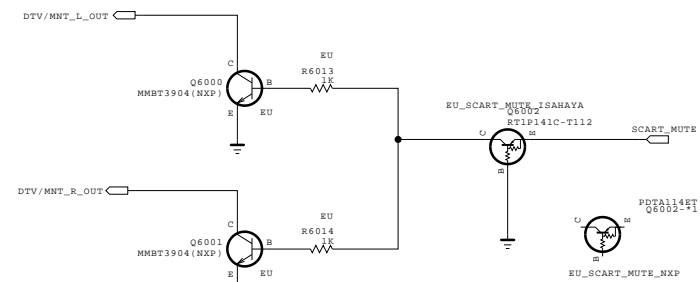
SECRET  
LGElectronics





|       |                   |       |      |
|-------|-------------------|-------|------|
| MODEL | H13_UD            | DATE  |      |
| BLOCK | AUDIO[HEIGHT CH.] | SHEET | 58 / |



[ SCART AUDIO MUTE ]



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

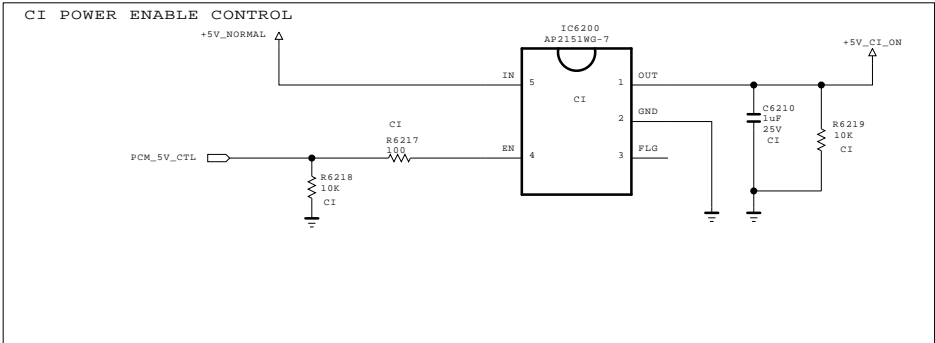
SECRET  
LGElectronics





|       |                 |       |            |
|-------|-----------------|-------|------------|
| MODEL | SCART AUDIO AMP | DATE  | 2011.11.21 |
| BLOCK |                 | SHEET | 60 /       |







THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

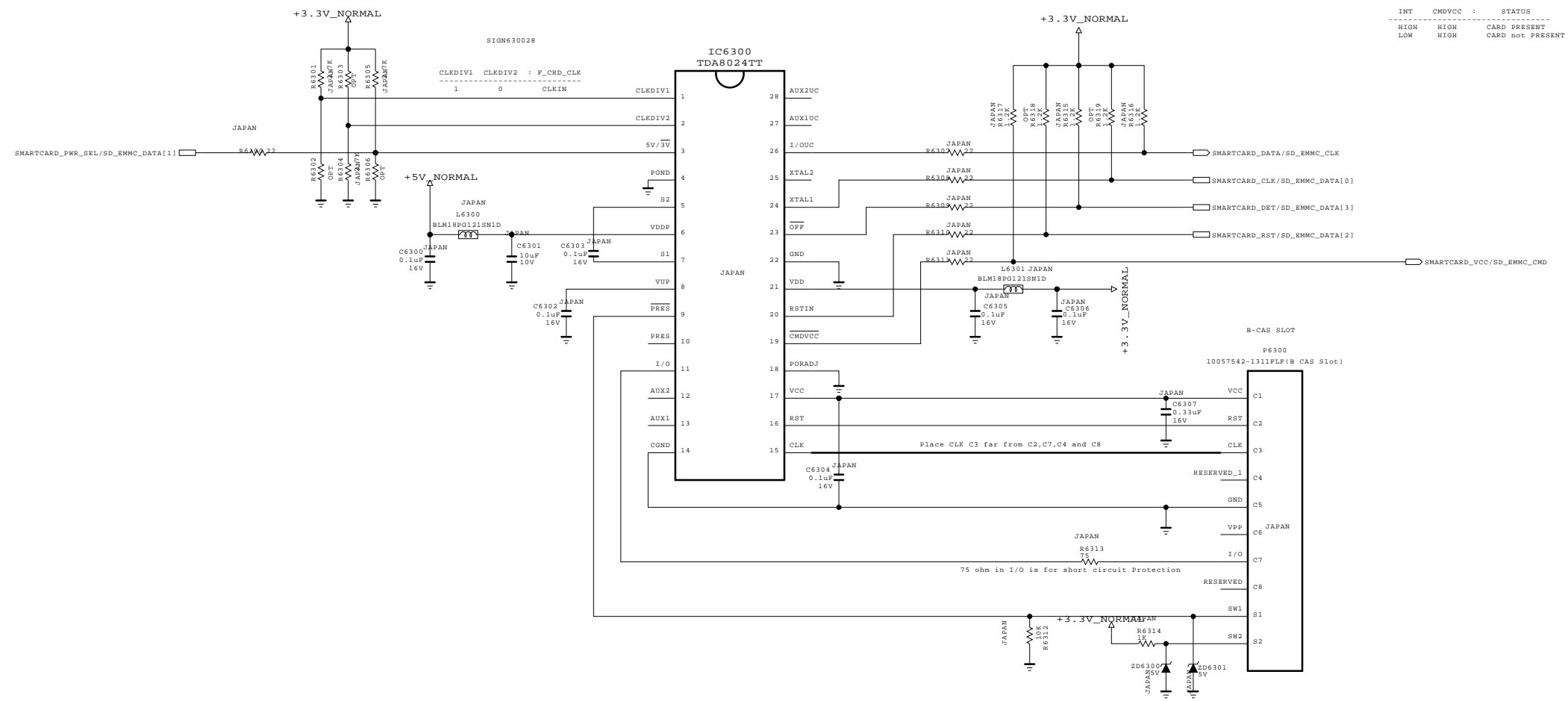
SECRET  
LGElectronics





LG ELECTRONICS

|       |         |       |            |
|-------|---------|-------|------------|
| MODEL | CI SLOT | DATE  | 2011.10.31 |
| BLOCK |         | SHEET | 62 /       |

B-CAS (SMART CARD) INTERFACE



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics

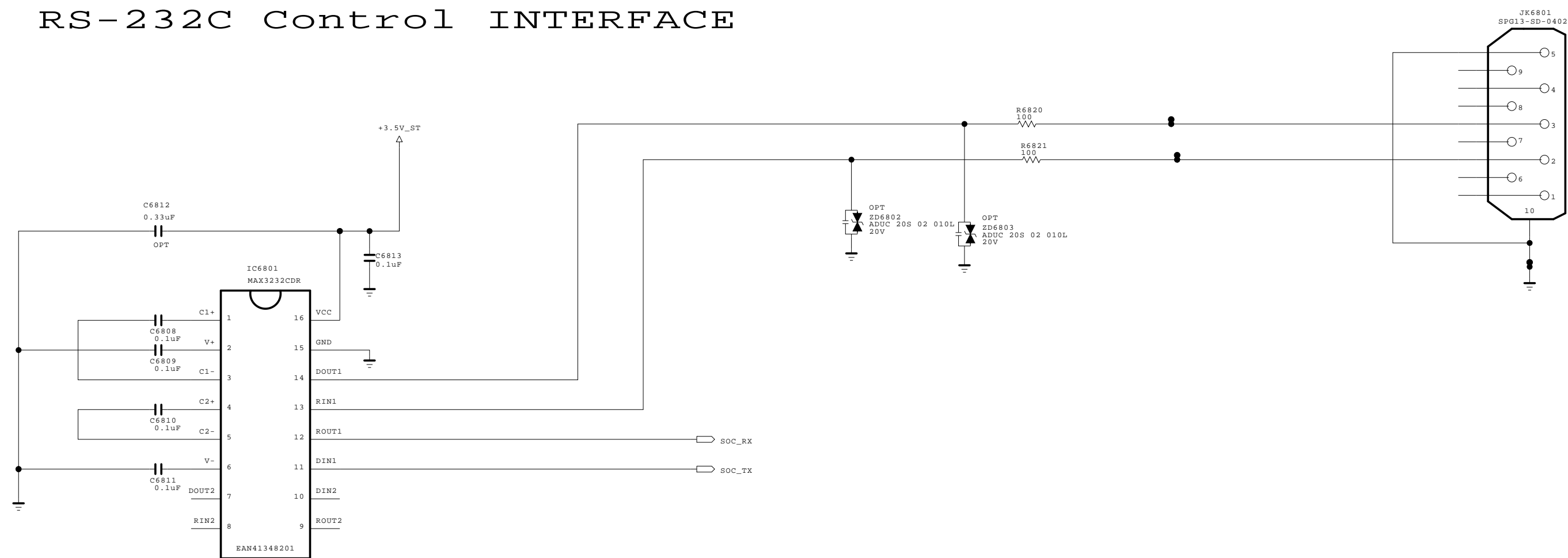




|       |         |       |            |
|-------|---------|-------|------------|
| MODEL | CI SLOT | DATE  | 2011.04.17 |
| BLOCK |         | SHEET | 62 /       |





RS-232C Control INTERFACE



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

|               |                                                                                                      |
|---------------|------------------------------------------------------------------------------------------------------|
| SECRET        |  LG ELECTRONICS |
| LGElectronics |                                                                                                      |

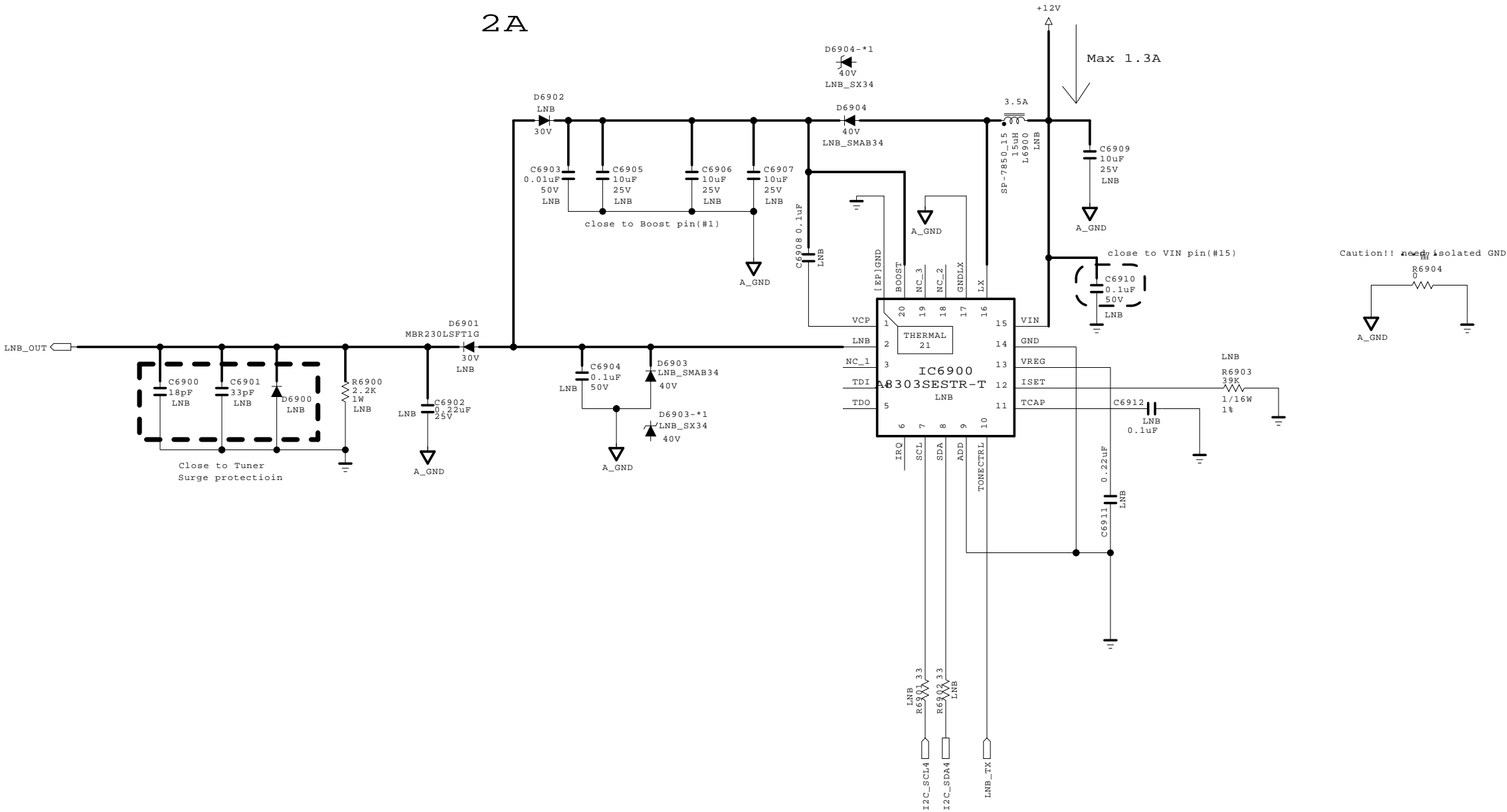
|       |        |       |              |
|-------|--------|-------|--------------|
| MODEL |        | DATE  | 12 / 08 / 16 |
| BLOCK | RS232C | SHEET | 68 /         |



DVB-S2 LNB Part Allegro

(Option:LNB)

3A

Input trace widths should be sized to conduct at least 3A  
Ouput trace widths should be sized to conduct at least 2A



THE  SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMETIC.

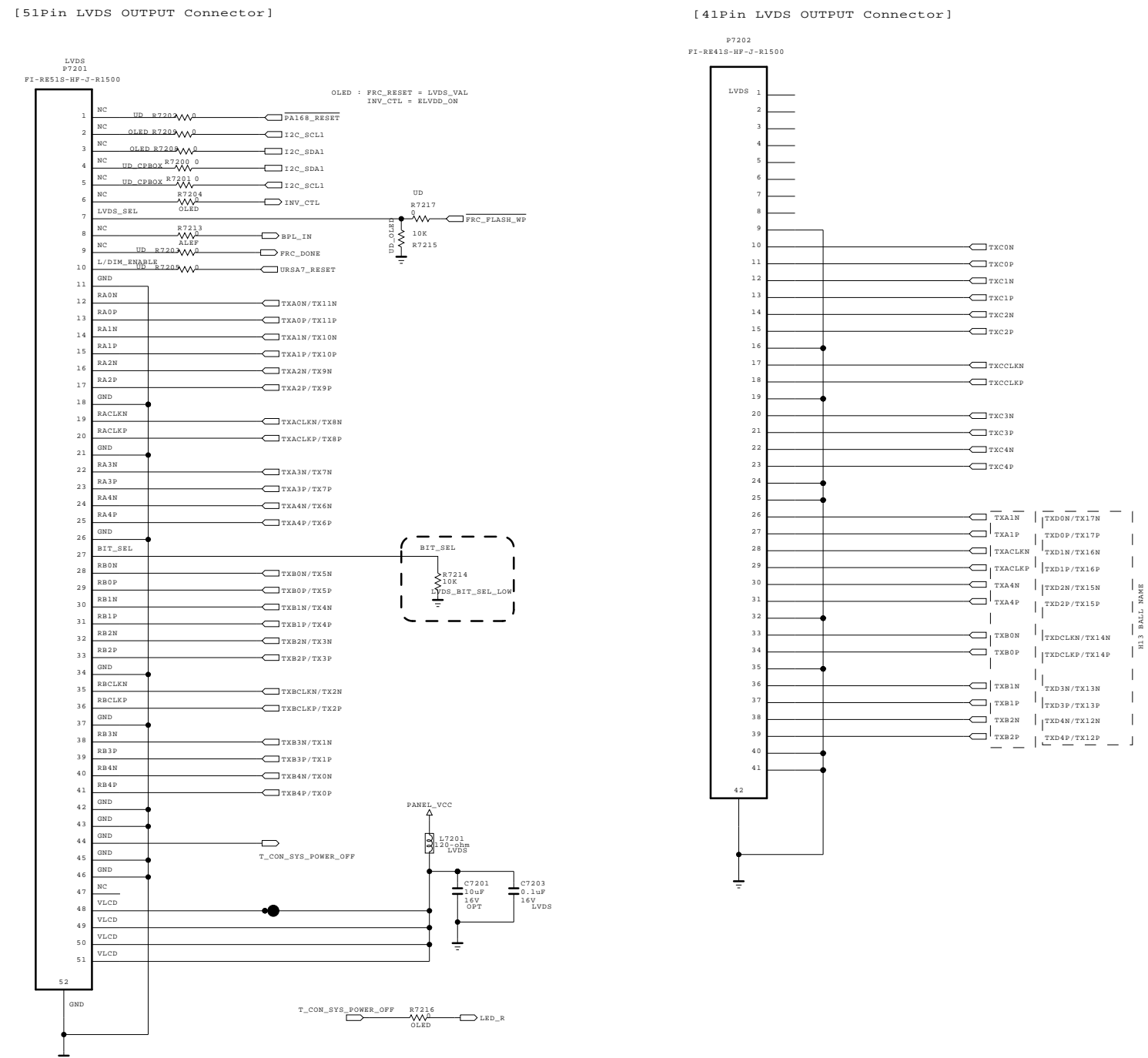
SECRET



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 LG ELECTRONICS

|       |     |       |            |
|-------|-----|-------|------------|
| MODEL | LNB | DATE  | 2012.03.08 |
| BLOCK |     | SHEET | 69 /       |

## LVDS



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LG Electronics

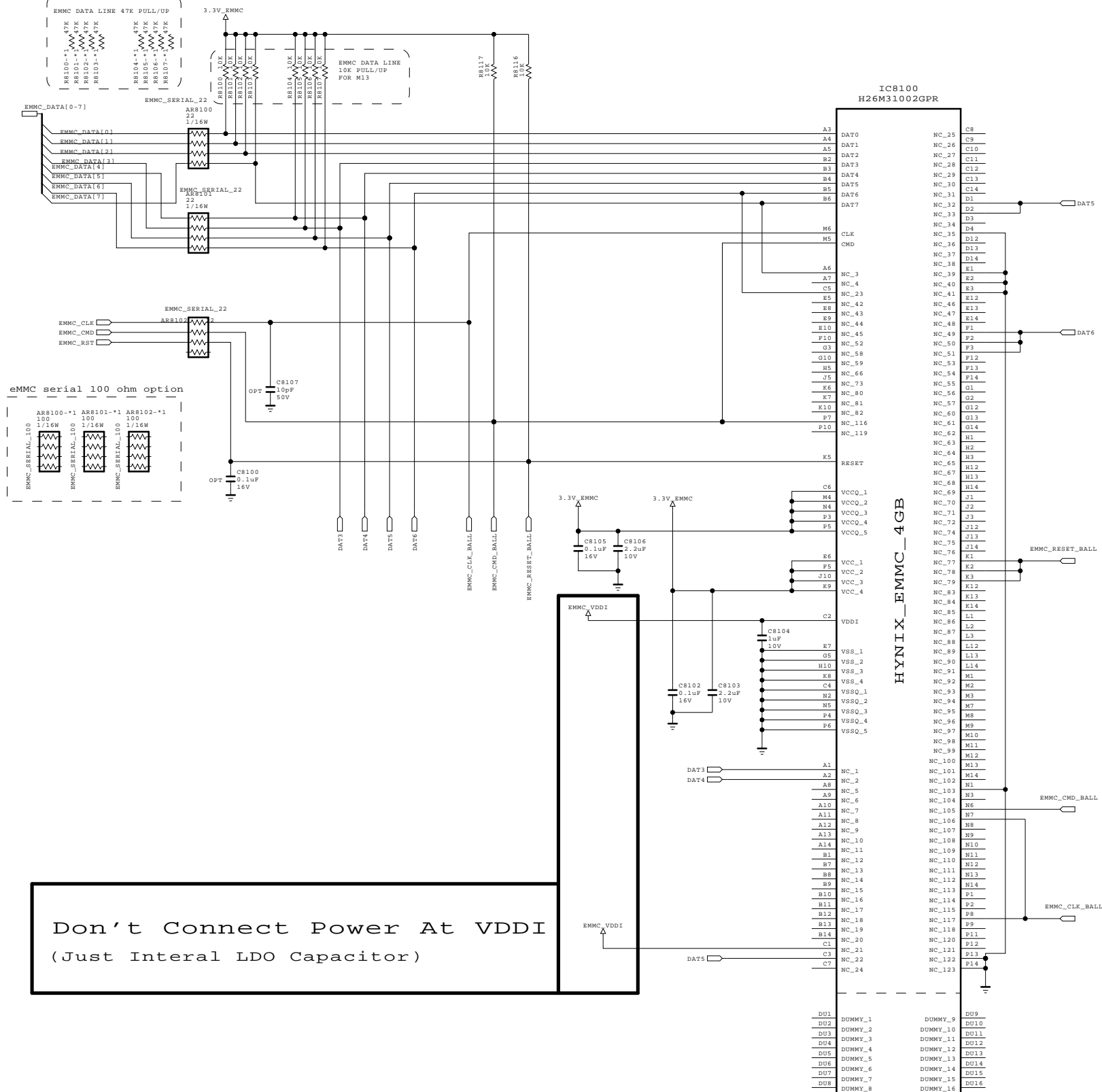


BSD-NC4\_H072-HD

|       |                |       |            |
|-------|----------------|-------|------------|
| MODEL |                | DATE  | 2012-10-15 |
| BLOCK | LVDS INTERFACE | SHEET | /          |



## eMMC I/F



THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

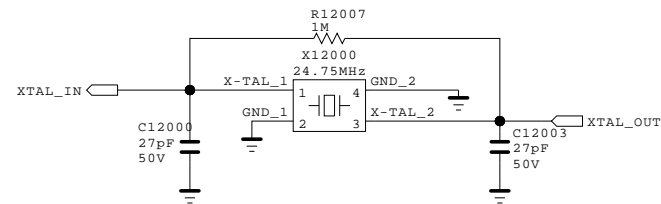
SECRET  
LGElectronics

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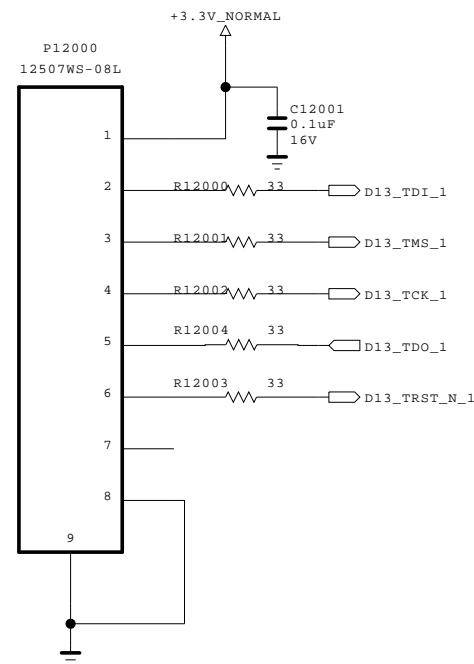
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|-------|------|-------|----------|
| MODEL | eMMC | DATE  | 11.09.29 |
| BLOCK |      | SHEET | 81       |

# HEVC option sheet

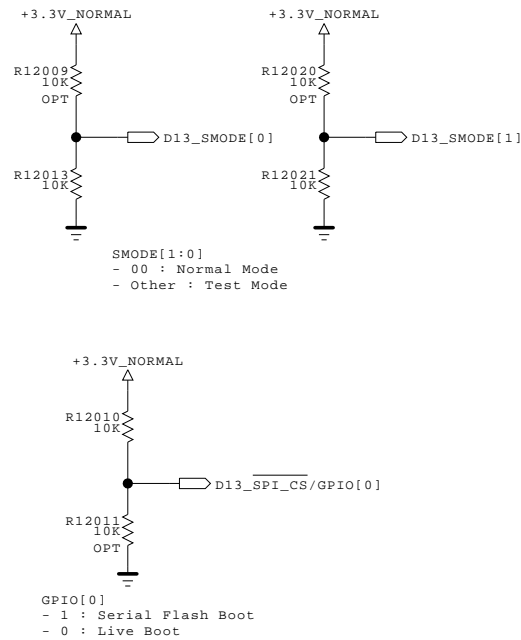
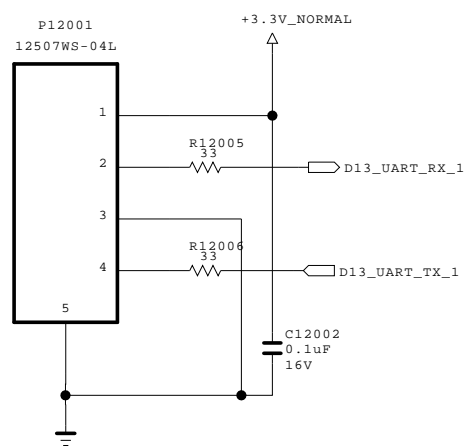
XTAL ( 24.75MHz )



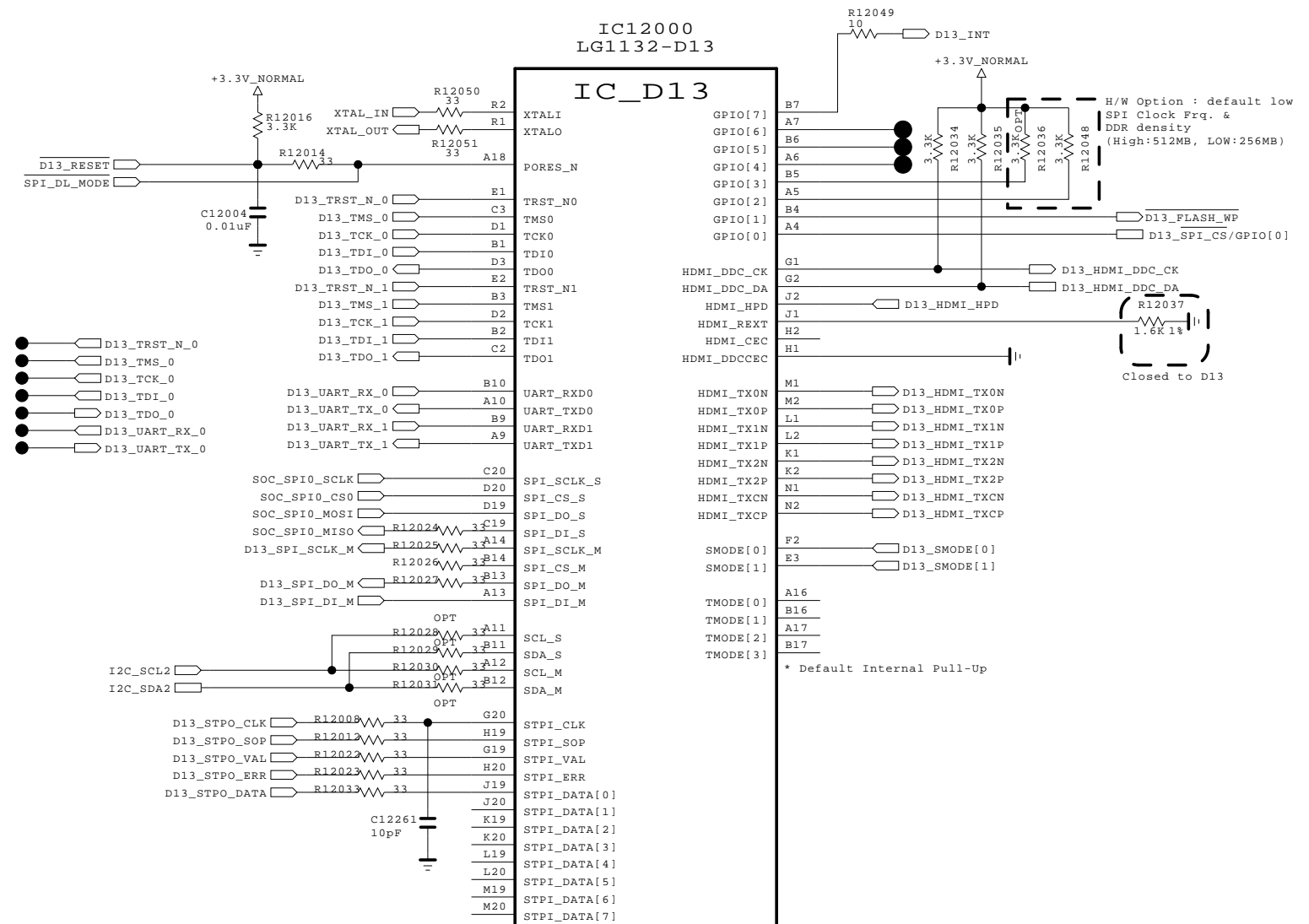
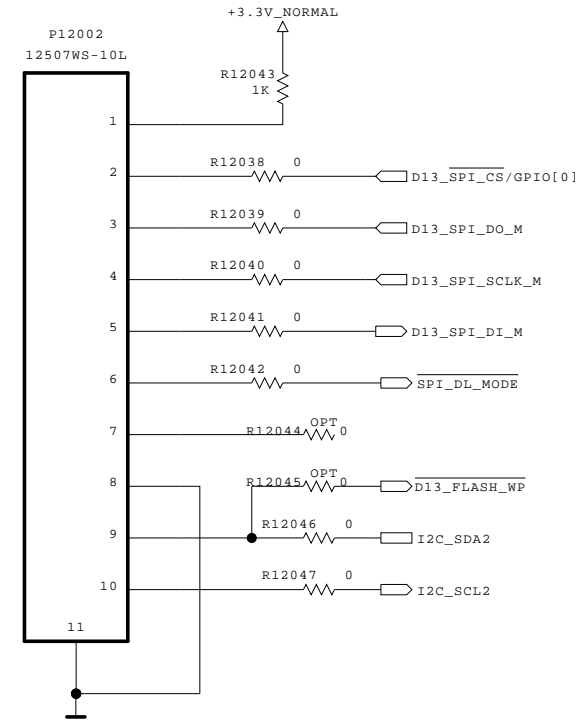
JTAG for HEVC



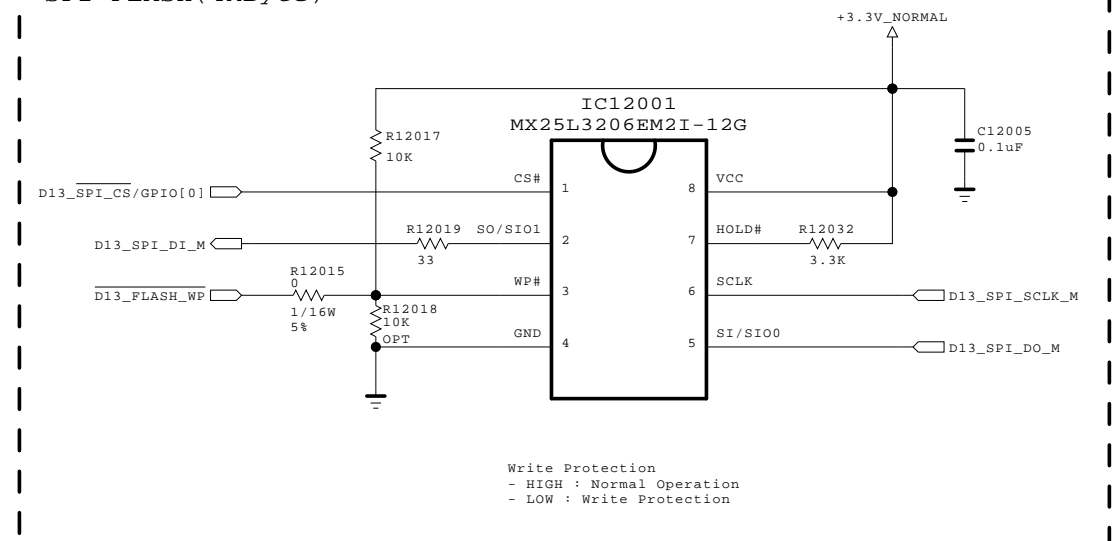
UART For HEVC





Serial Flash Boot Test



SPI FLASH (4MByte)



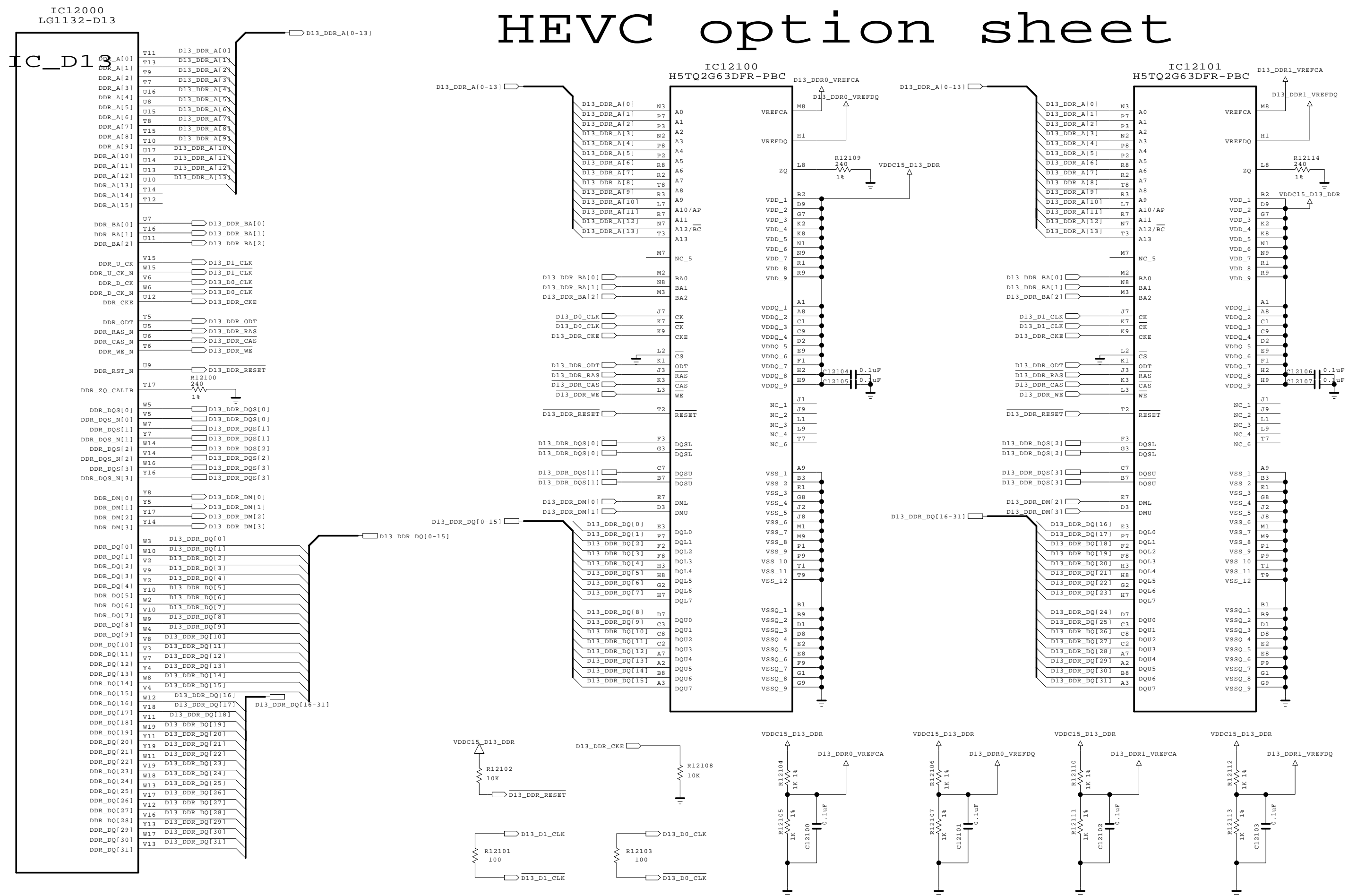
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SECRET  
LGElectronics

 LG ELECTRONICS

|       |  |       |   |
|-------|--|-------|---|
| MODEL |  | DATE  |   |
| BLOCK |  | SHEET | / |

# HEVC option sheet



THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

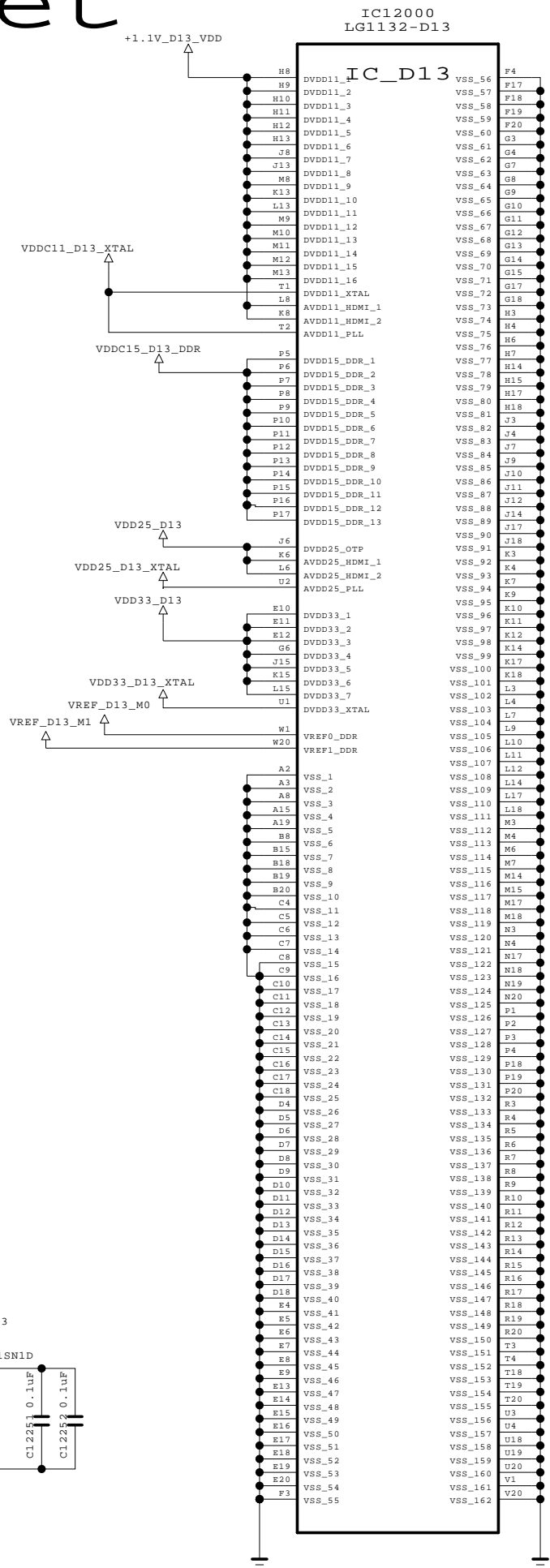
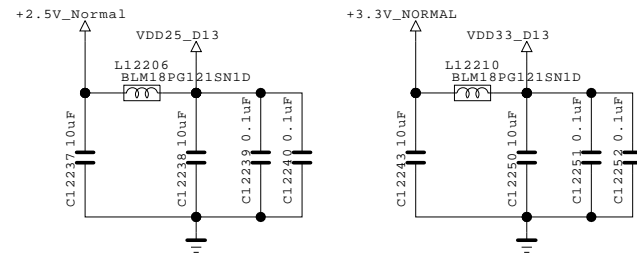
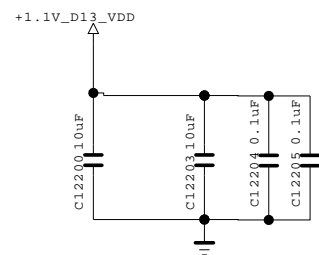
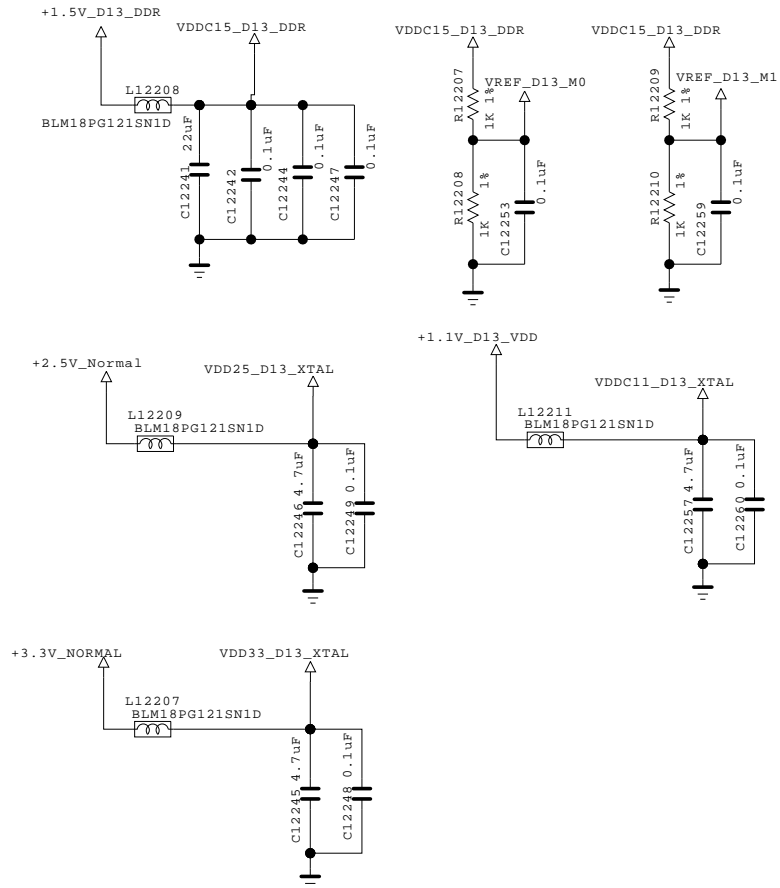
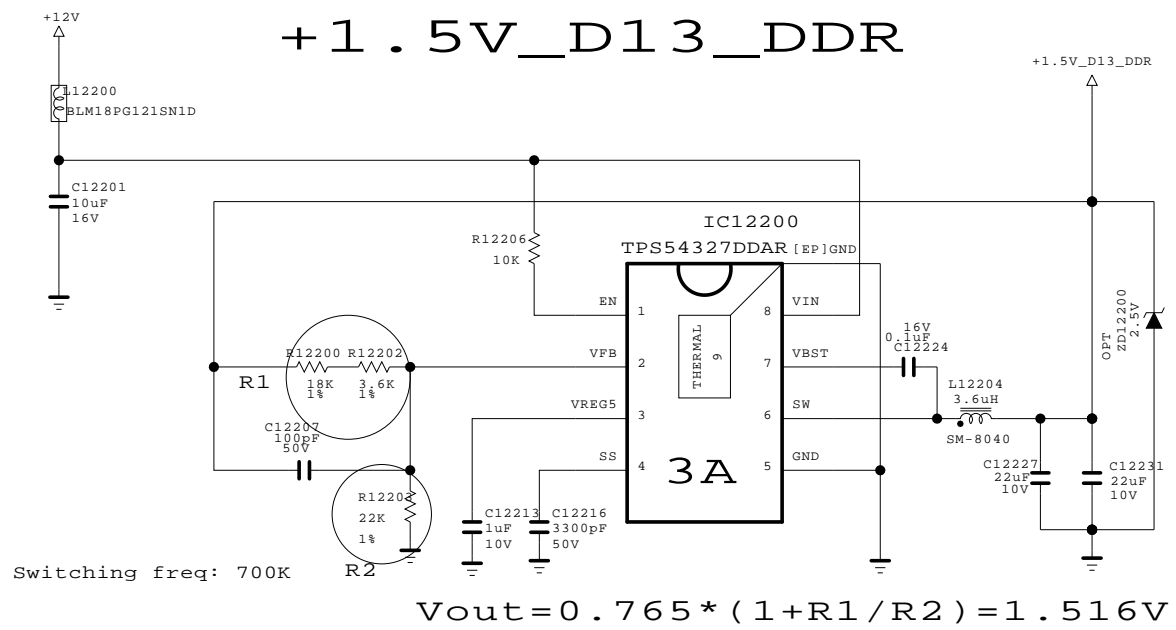
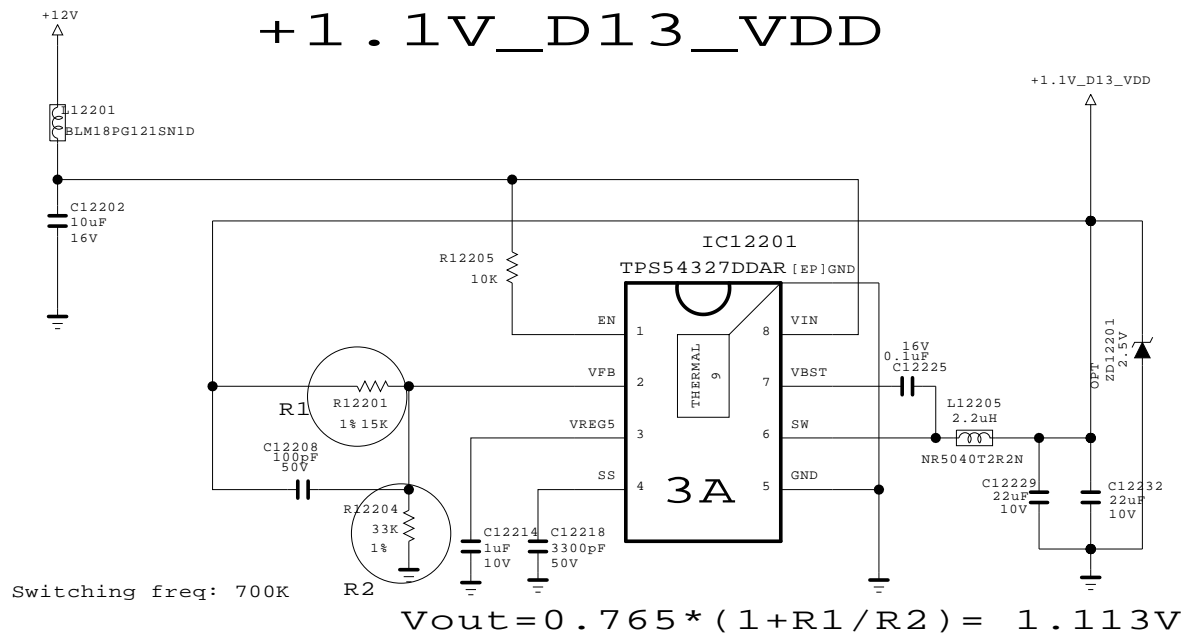
SECRET  
LGElectronics



MODEL  
BLOCK

|       |
|-------|
| DATE  |
| SHEET |

# HEVC option sheet



THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

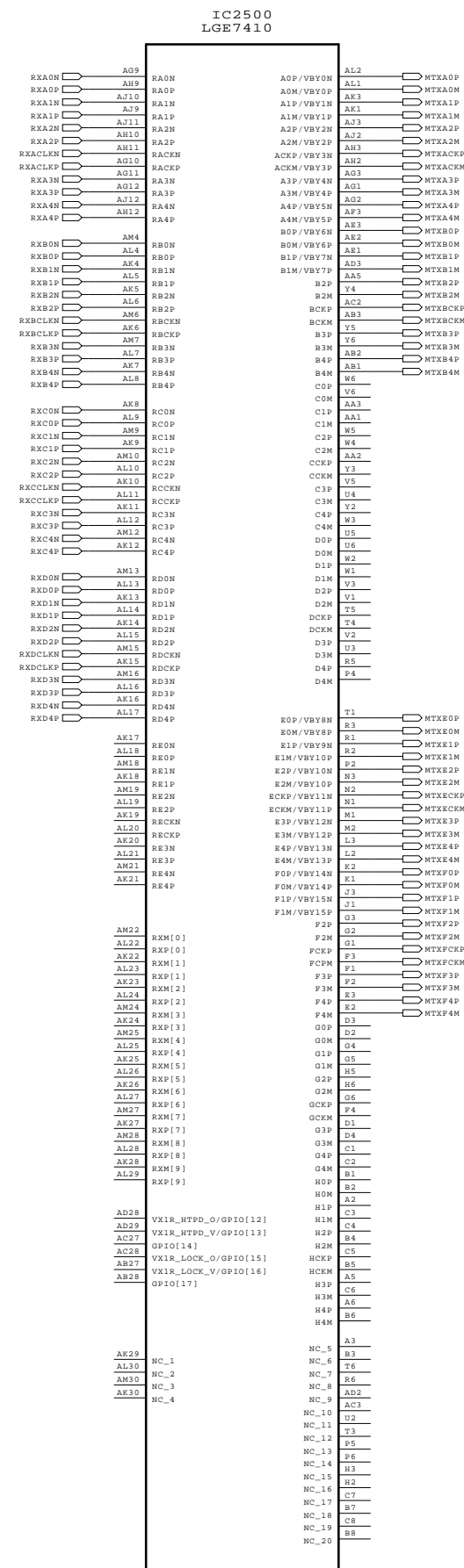
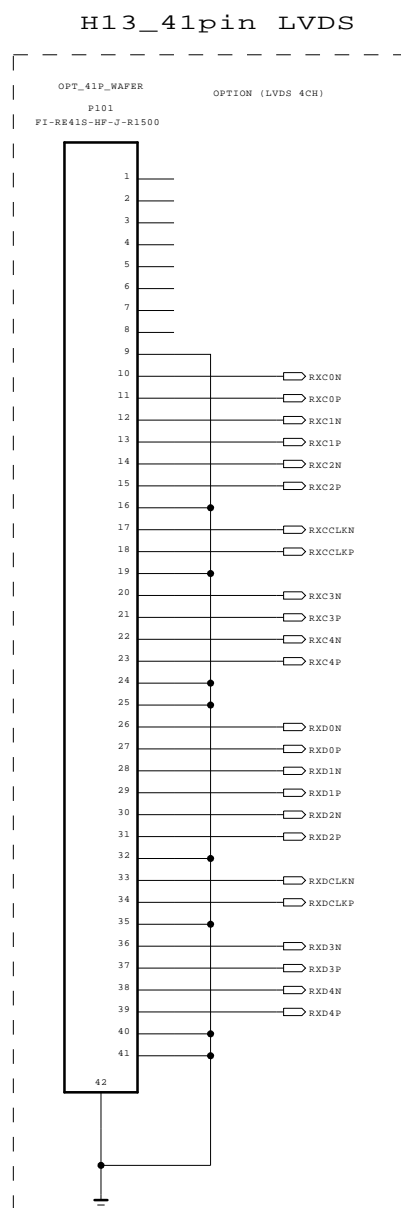
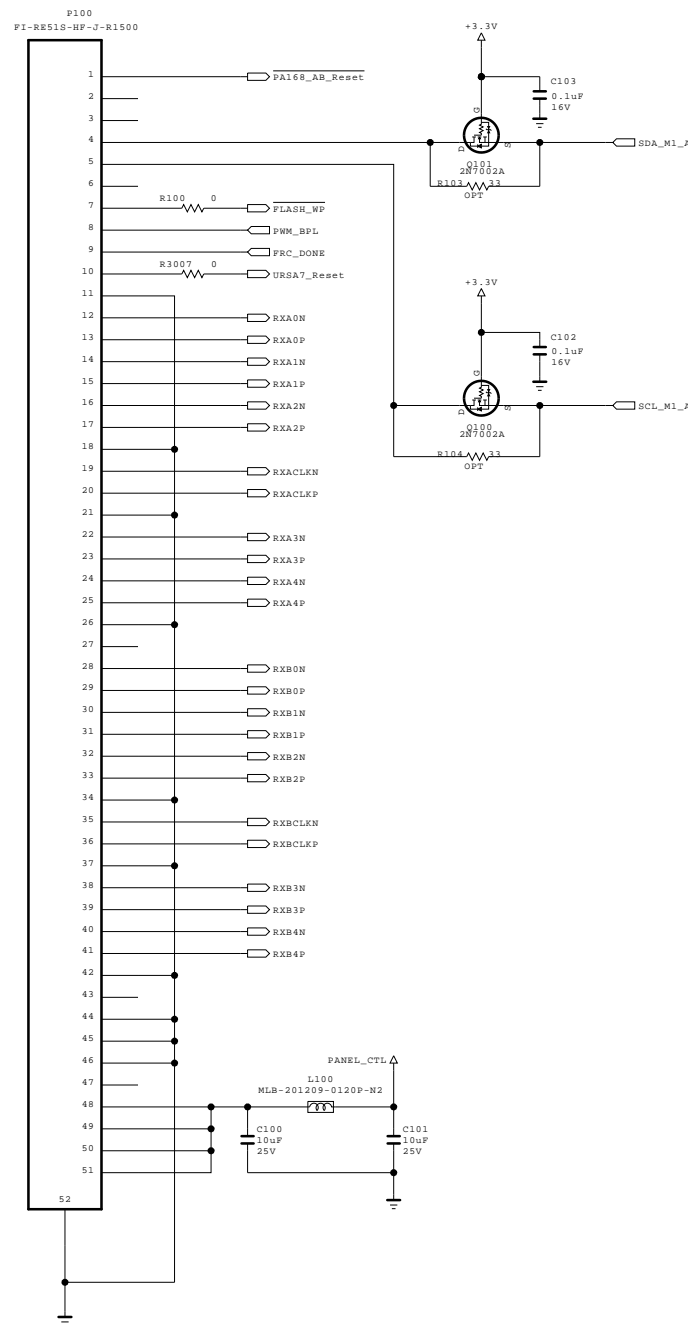
SECRET  
LG Electronics



MODEL  
BLOCK

|       |
|-------|
| DATE  |
| SHEET |

```
[51P HS-LVDS input wafer][41P HS-LVDS input wafer]
```



THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

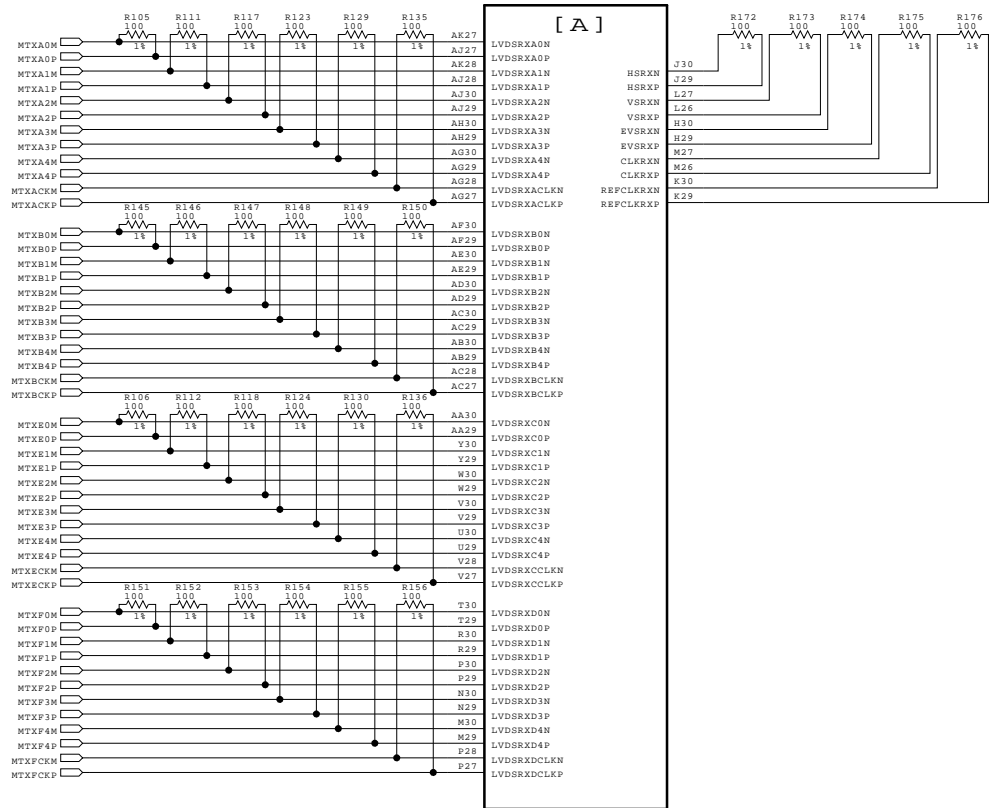
SECRET  
LGElectronics



|       |              |       |            |
|-------|--------------|-------|------------|
| MODEL | EAX65309301  | DATE  | 2013.03.18 |
| BLOCK | U_LVDS INPUT | SHEET | 2 / 22     |

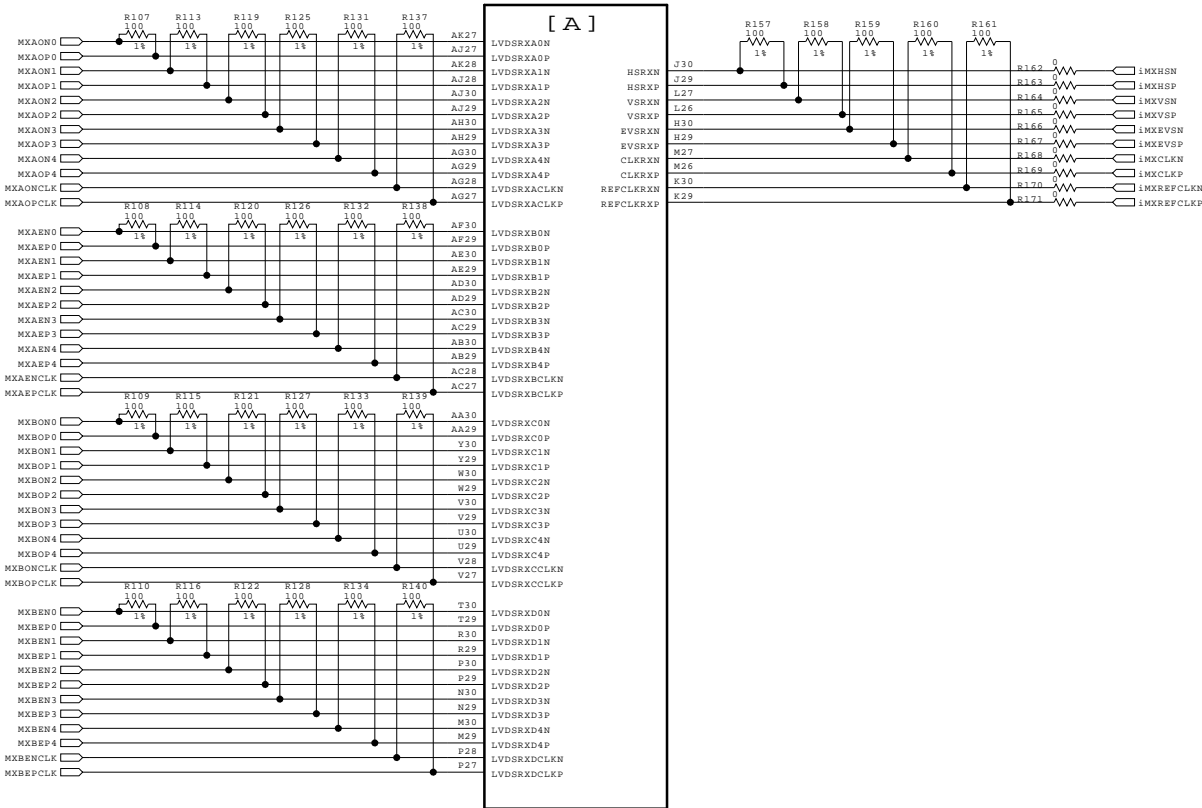
Master

IC100  
PA168-ES

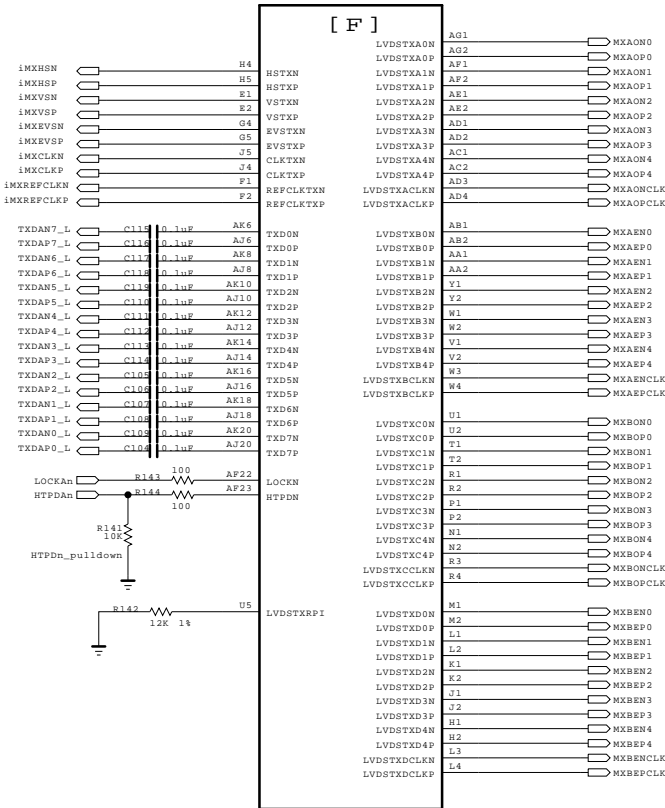




Slave

IC200  
PA168-ES



IC100  
PA168-ES



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

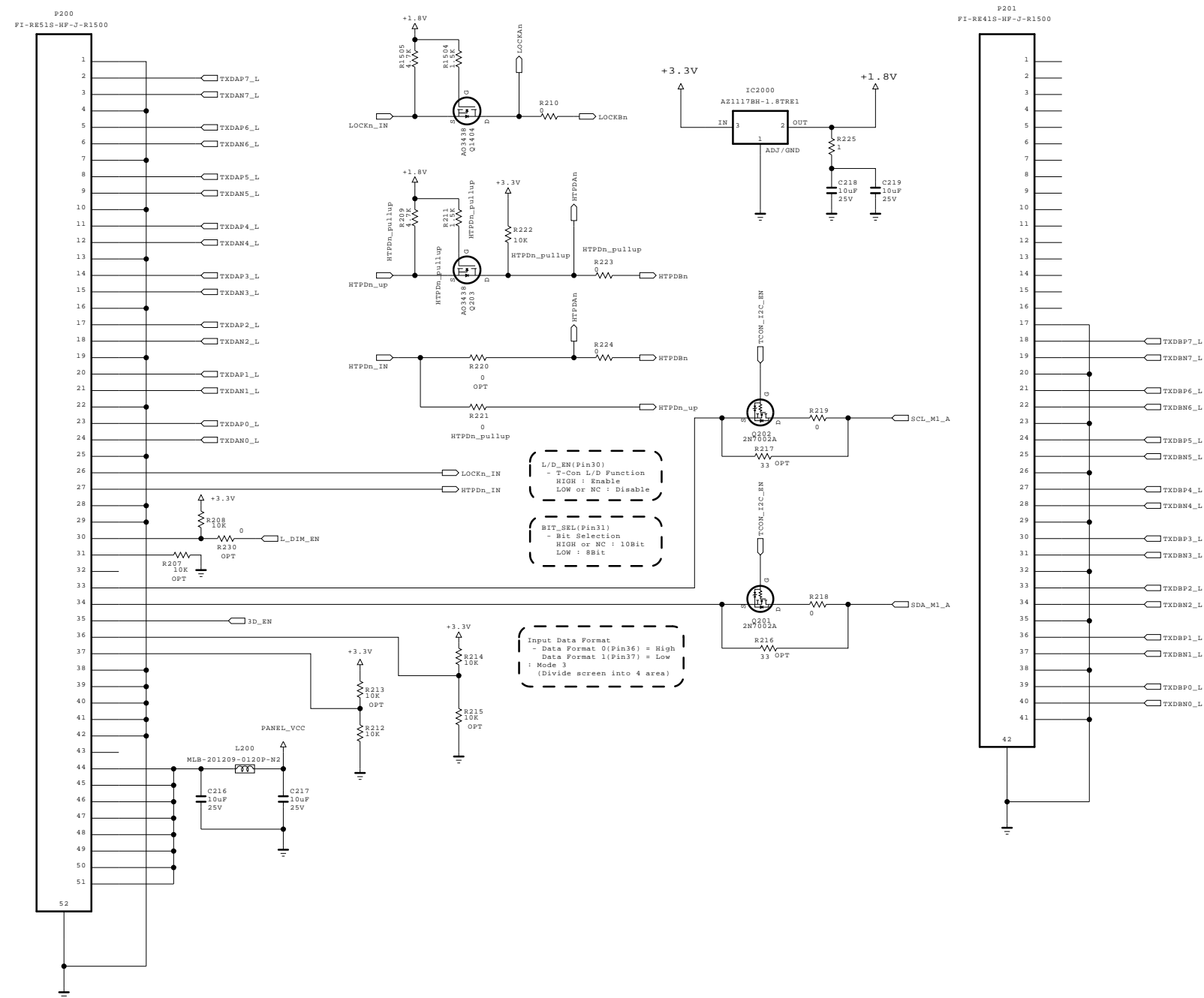
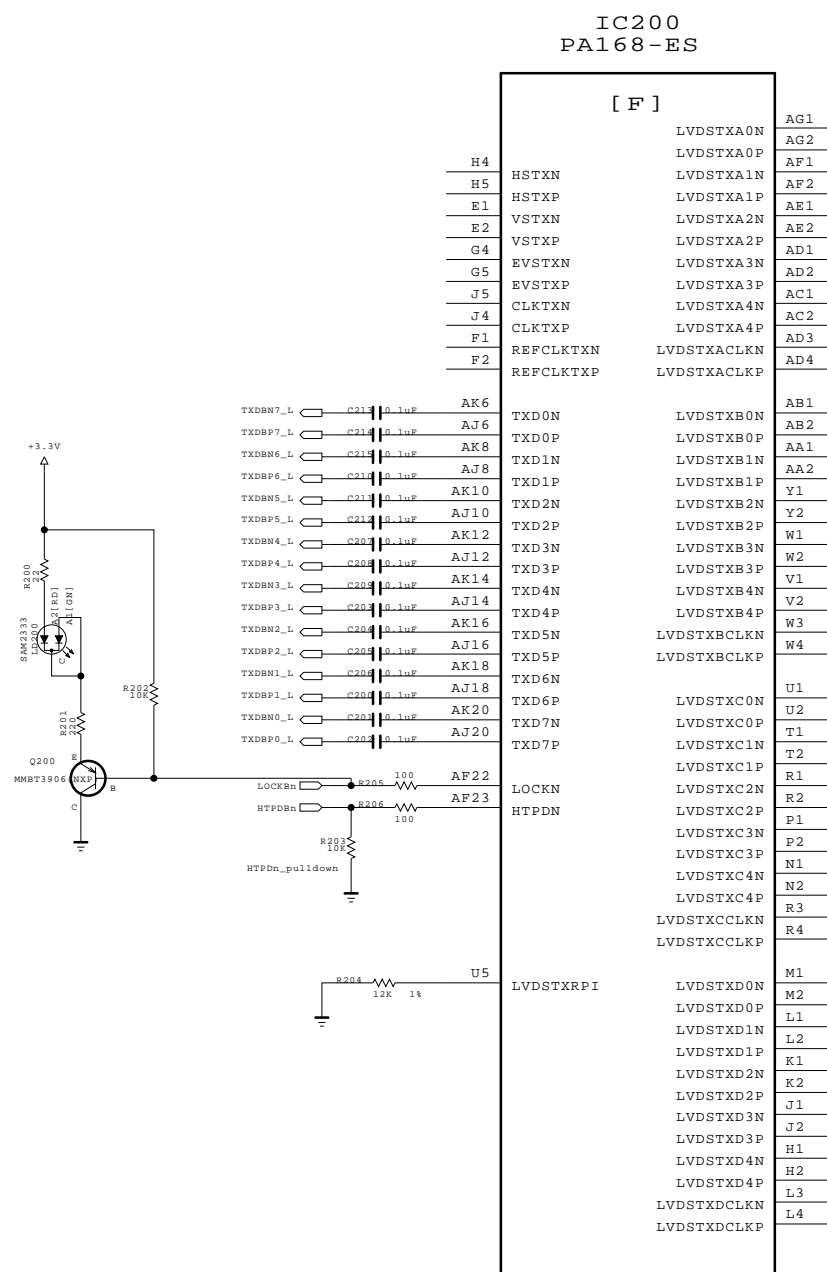
SECRET  
LGElectronics



|       |              |       |            |
|-------|--------------|-------|------------|
| MODEL | EAX65309301  | DATE  | 2013.03.18 |
| BLOCK | P_LVDS INPUT | SHEET | 3 / 22     |

[51P Vx1 output wafer]

[ 41P Vx1 output wafer ]



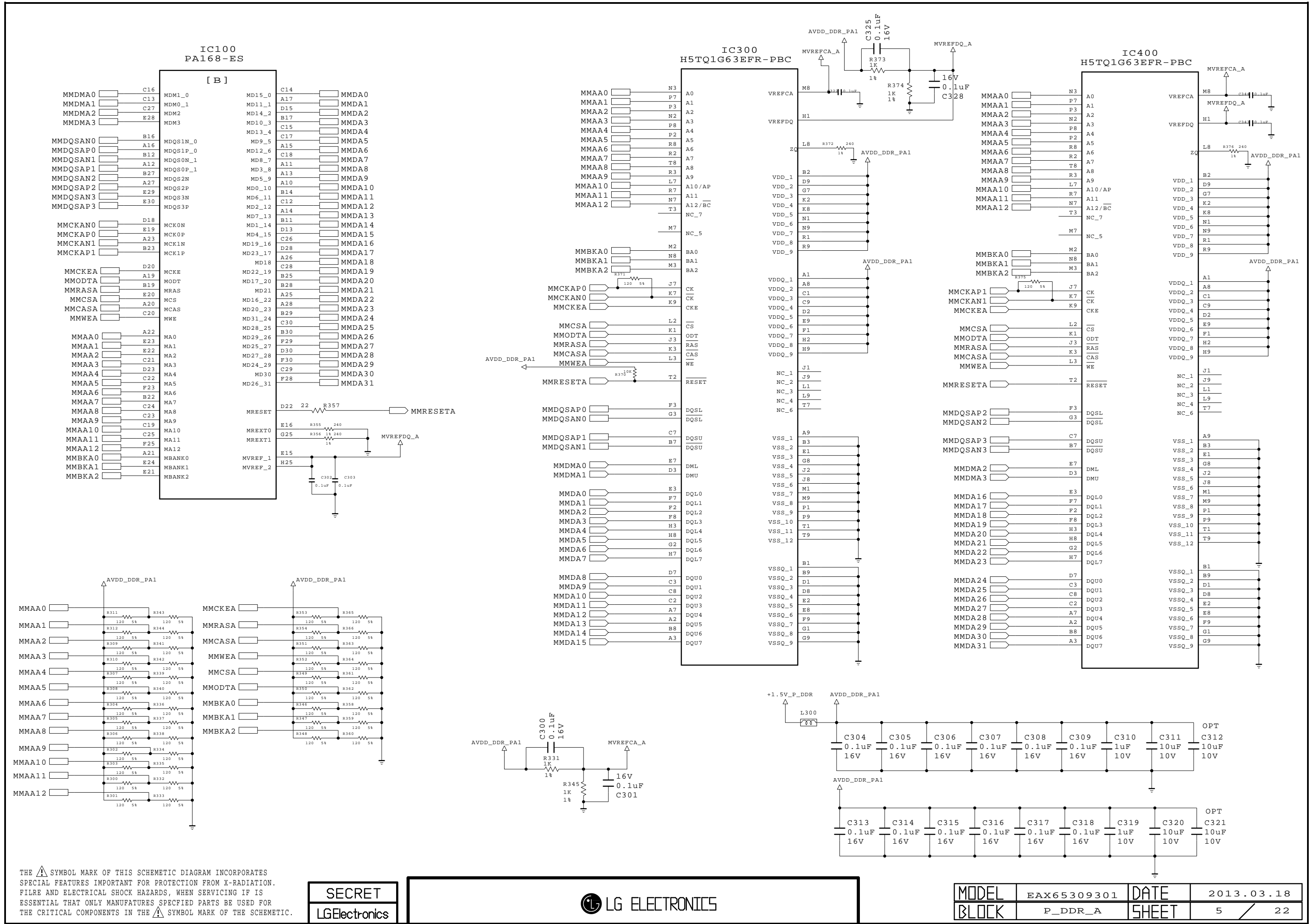
THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

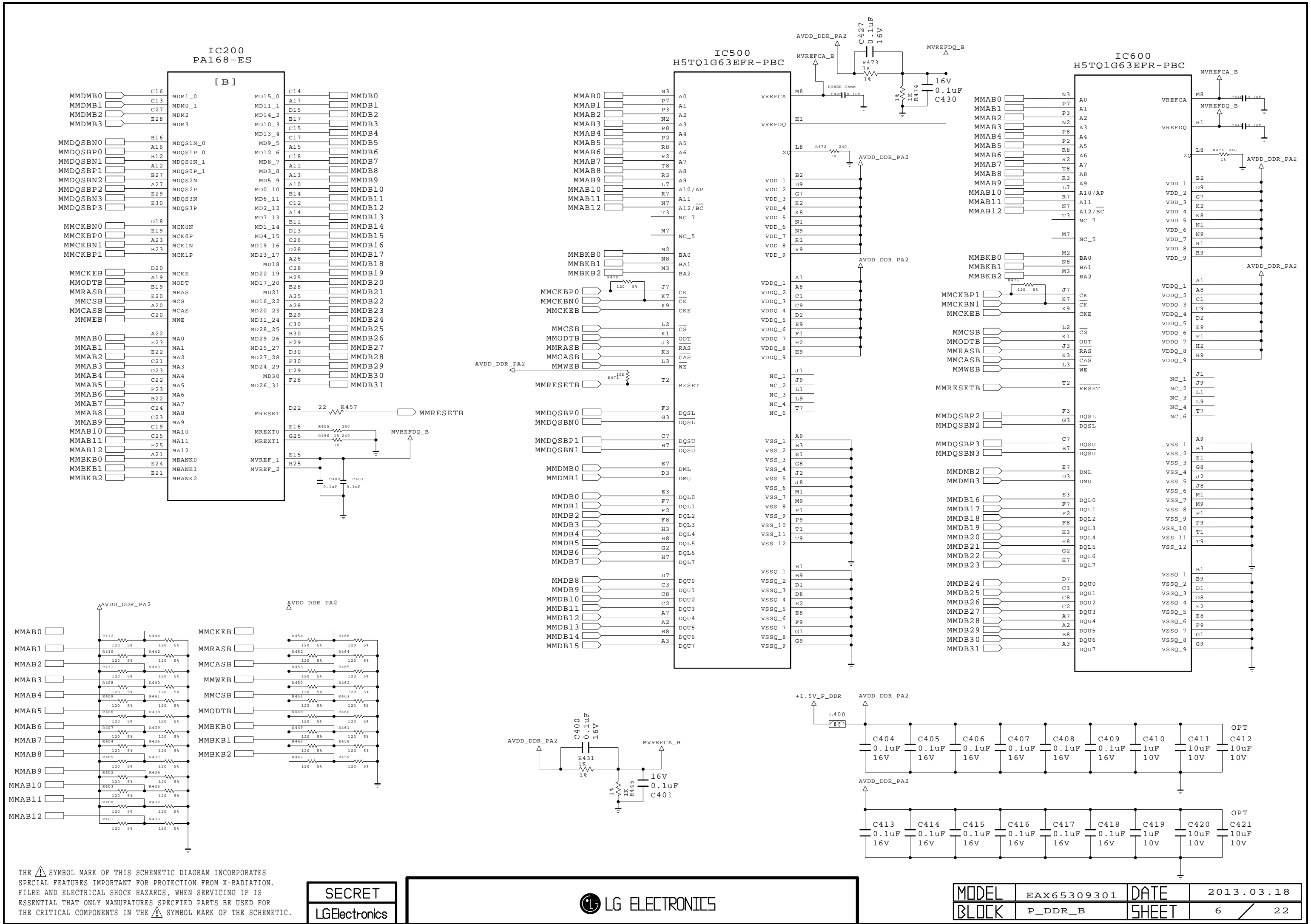
SECRET  
LGElectronics

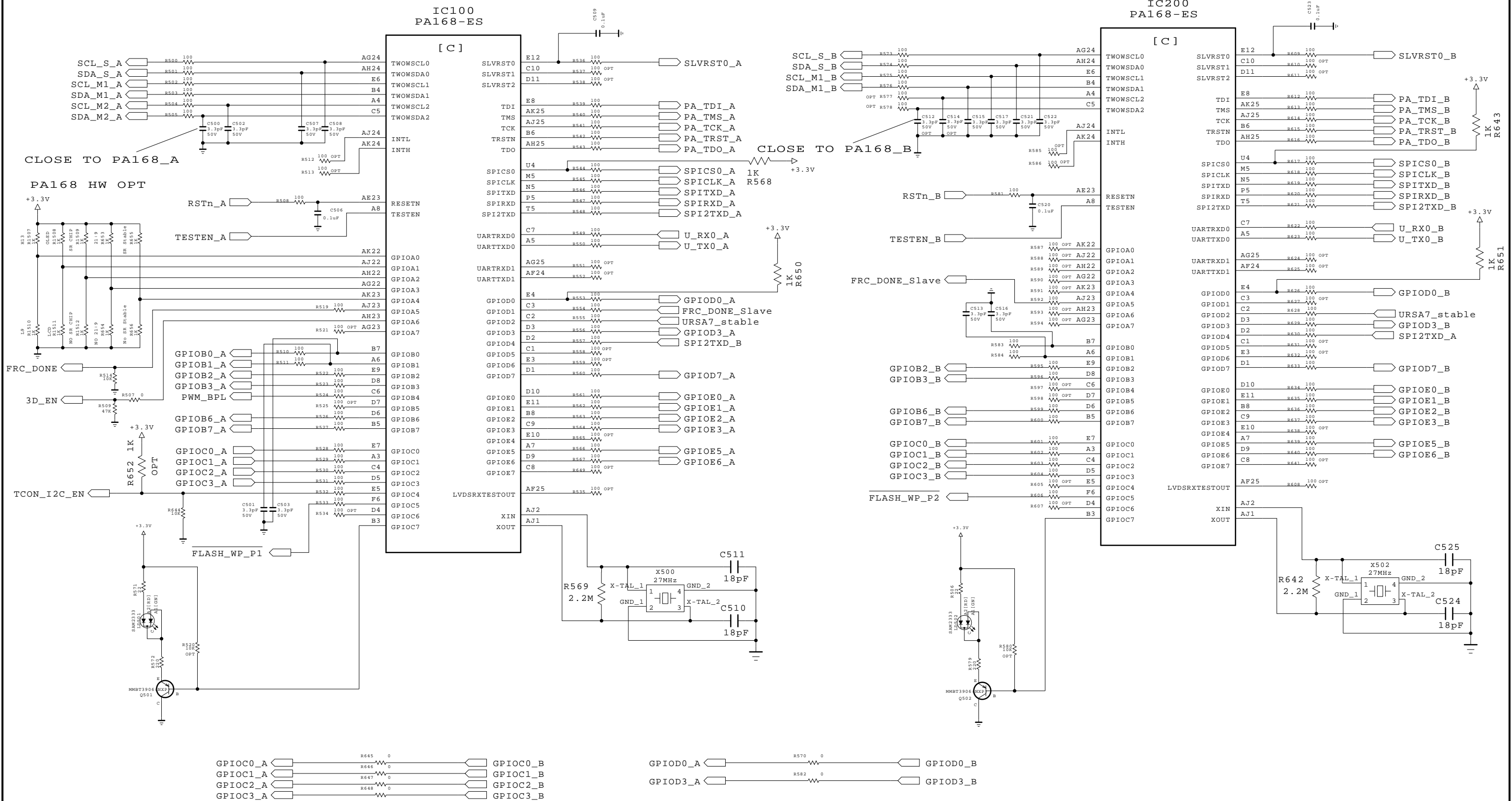




|       |              |       |            |
|-------|--------------|-------|------------|
| MODEL | EAX65309301  | DATE  | 2013.03.18 |
| BLOCK | P_Vx1 OUTPUT | SHEET | 4 / 22     |







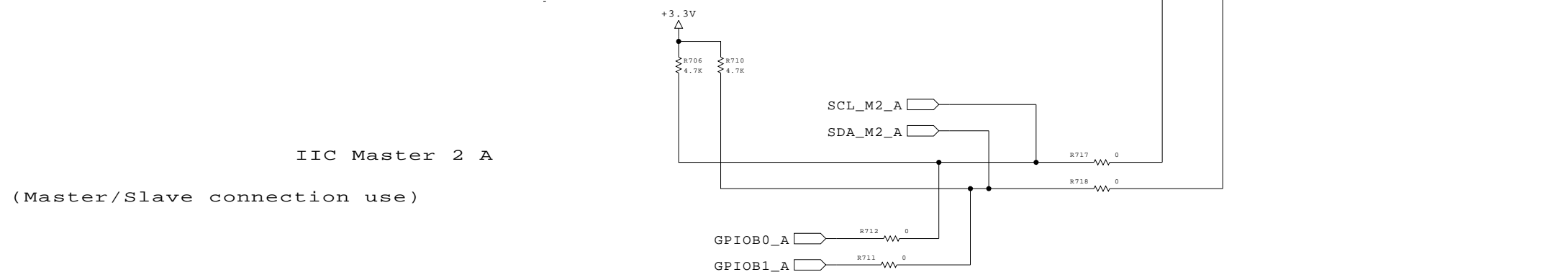
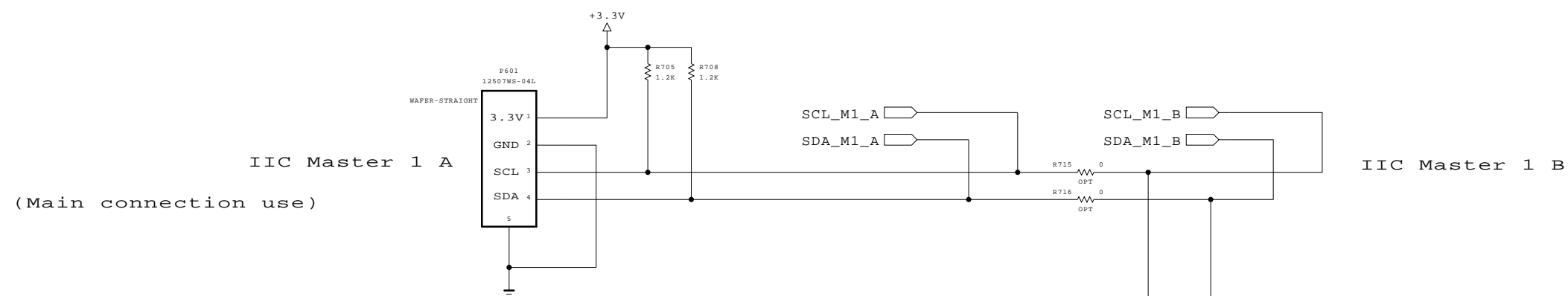
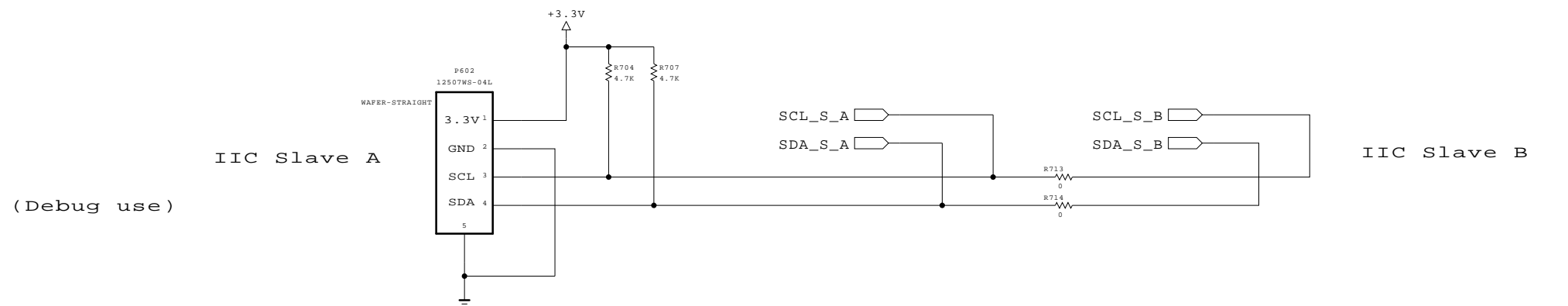
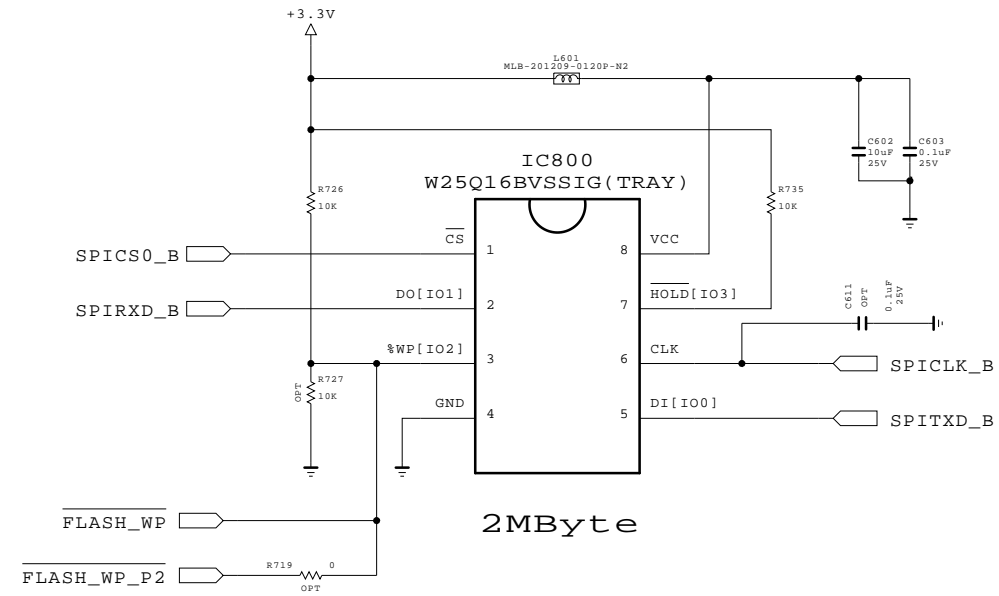
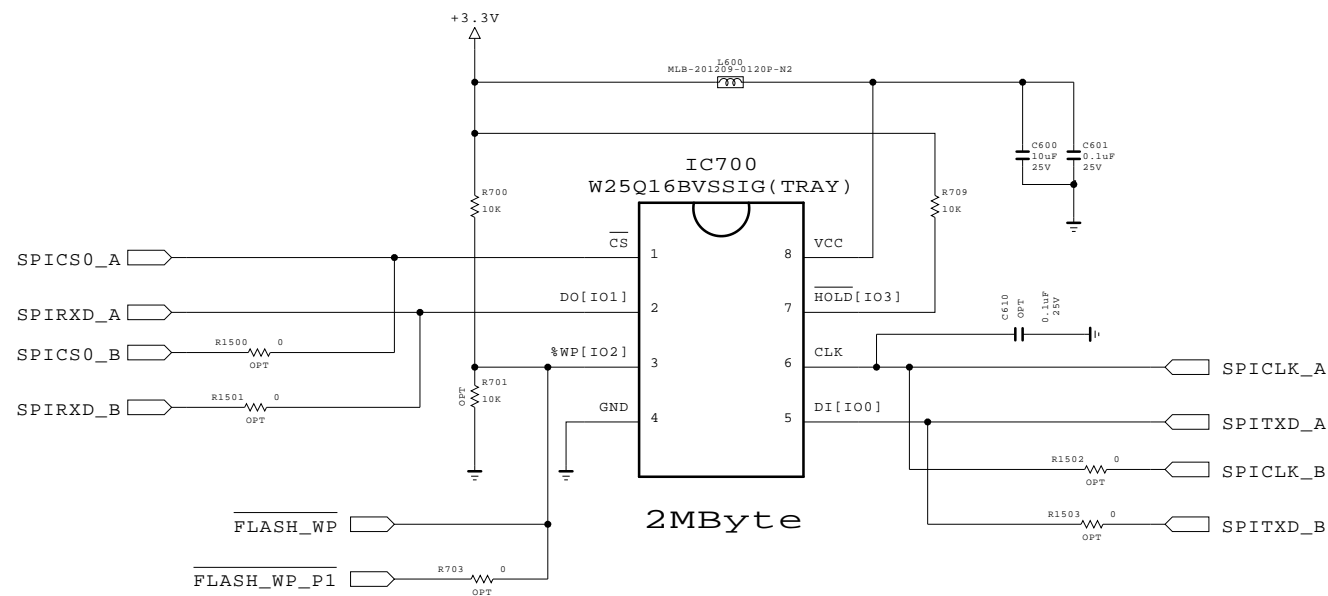




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|       |             |       |            |
|-------|-------------|-------|------------|
| MODEL | EAX65309301 | DATE  | 2013.03.18 |
| BLOCK | P_GPIO_AB   | SHEET | 8 / 22     |

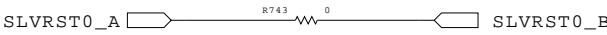
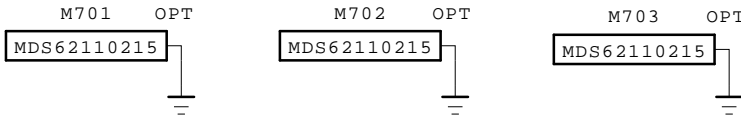
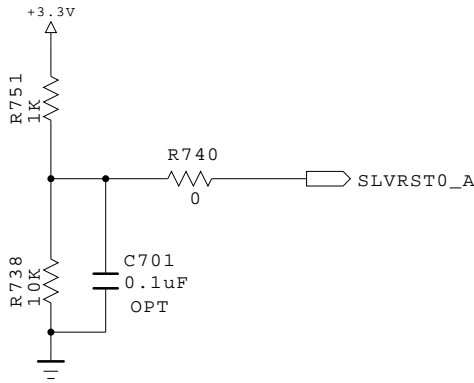
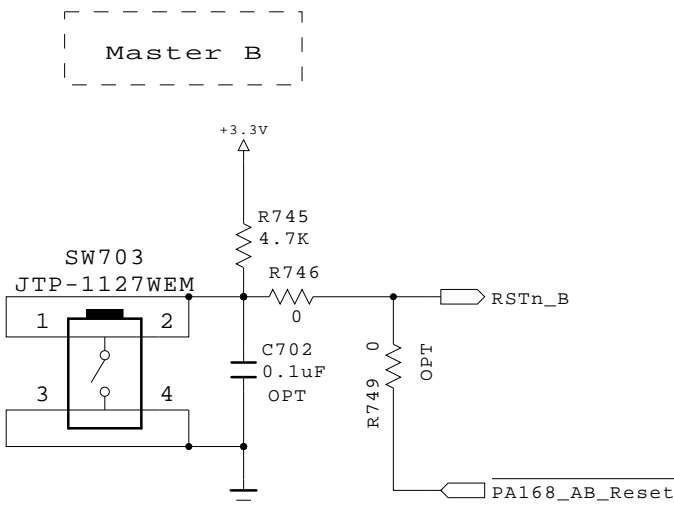
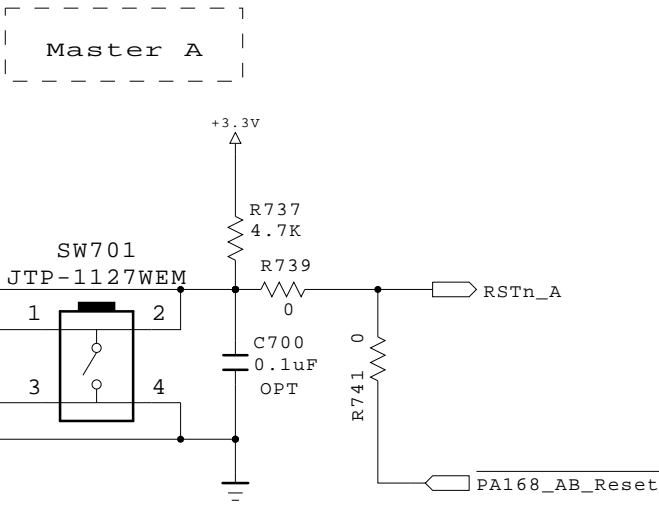




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|       |             |       |            |
|-------|-------------|-------|------------|
| MODEL | EAX65309301 | DATE  | 2013.03.14 |
| BLOCK | P_SPI, IIC  | SHEET | 9 / 22     |



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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|       |             |       |            |
|-------|-------------|-------|------------|
| MODEL | EAX65309301 | DATE  | 2013.03.18 |
| BLOCK | P_RESET     | SHEET | 10 / 22    |



The schematic diagram illustrates the I/O interface circuit for the STM32F103C8T6 microcontroller. It shows two rows of connections. The top row connects GPIOB2\_A to GPIOB2\_B via a resistor R836 (0 ohms) and a resistor R838 (0 ohms). The bottom row connects GPIOB3\_A to GPIOB2\_B via a resistor R835 (0 ohms) and a resistor R837 (0 ohms). Each pin is represented by a rectangle with a triangle pointing outwards.

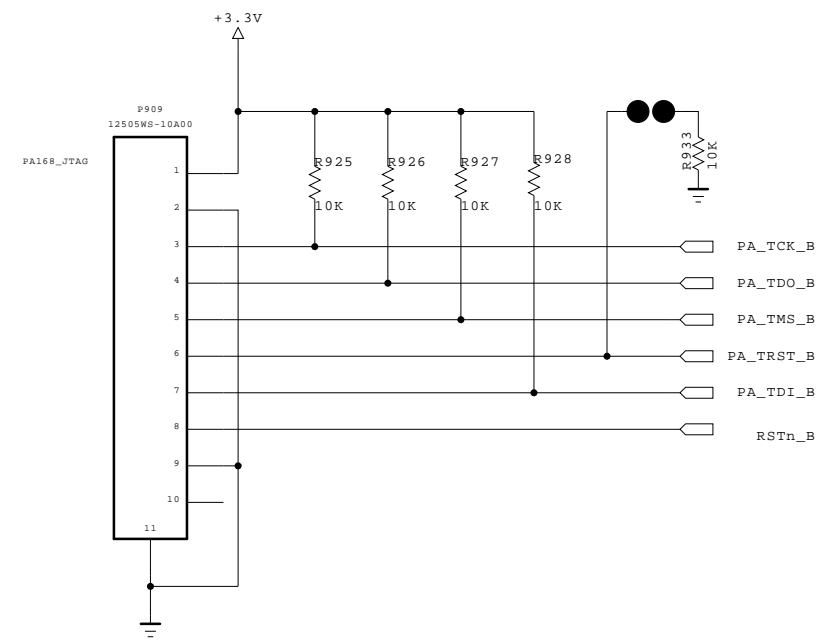
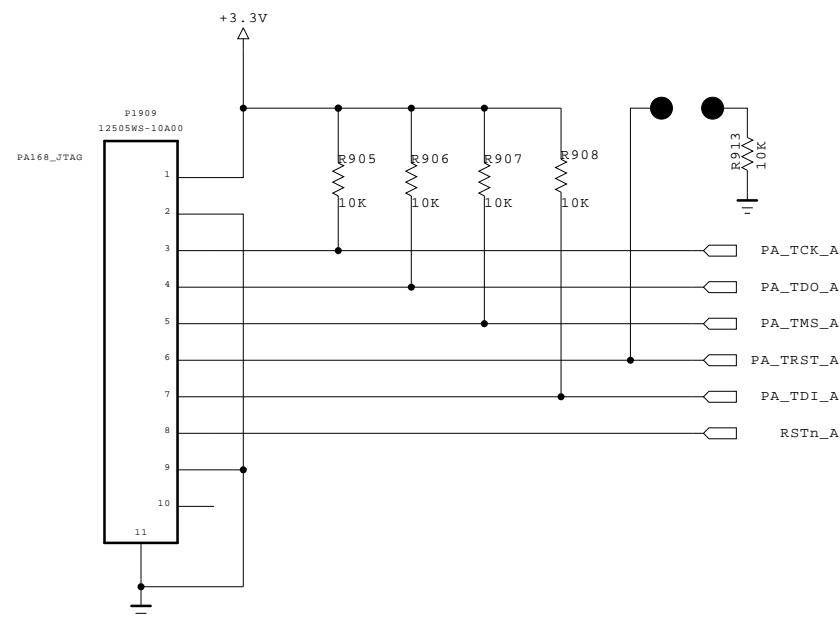
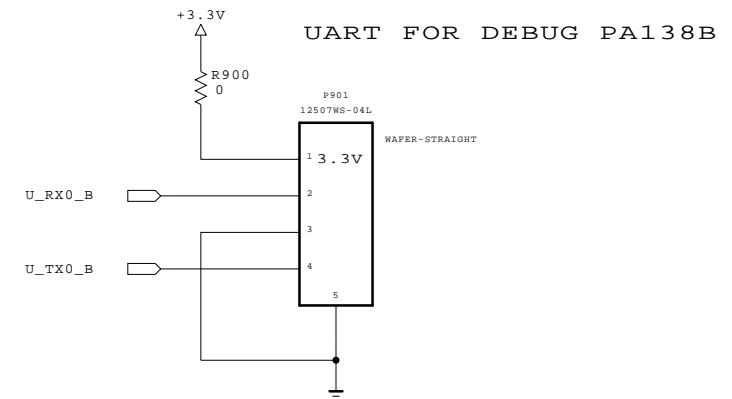
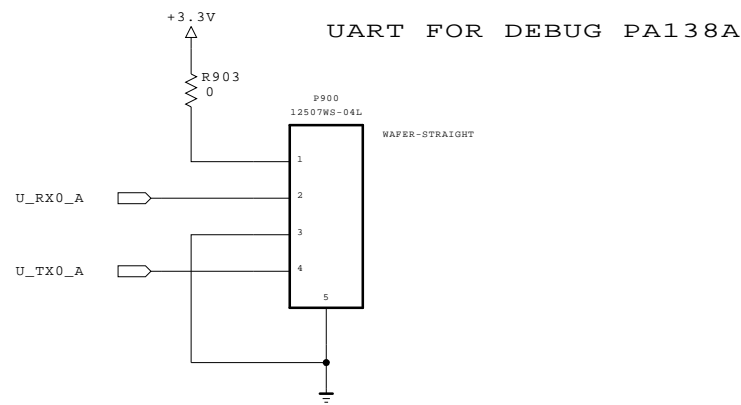
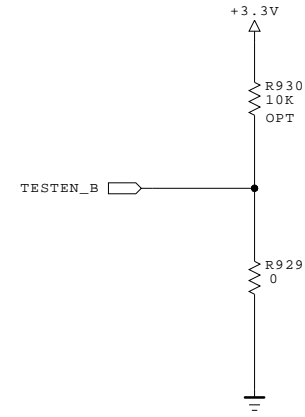
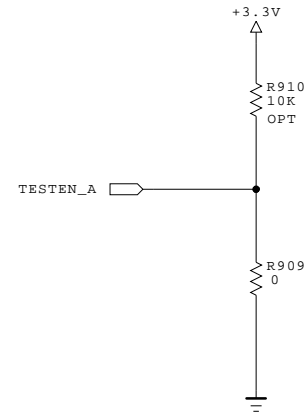
| Name                                   | Function                                                            |
|----------------------------------------|---------------------------------------------------------------------|
| Bootstrap0                             | 0:From SPI Flash<br>1:From internal ROM                             |
| Bootstrap1                             | 0:PA168 WORKS as the master chip<br>1:PA168 WORKS as the slave chip |
| Bootstrap2<br>Bootstrap3<br>Bootstrap4 | TWOWO bus address selection                                         |



## GPIO STATUS Connection

SECRET  
LGElectronics



|       |             |       |            |
|-------|-------------|-------|------------|
| MODEL | EAX65309301 | DATE  | 2013.03.18 |
| BLOCK | P_BOOTSTRAP | SHEET | 11 / 22    |



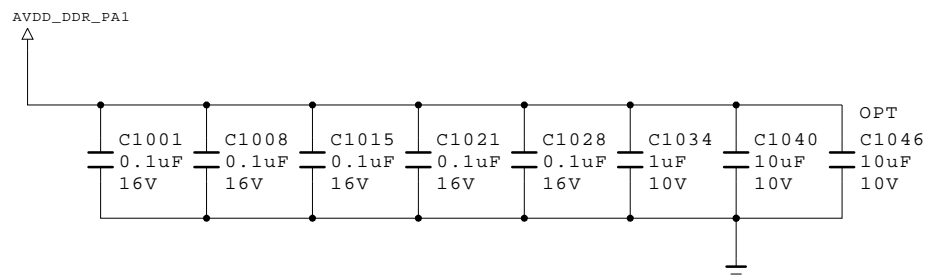
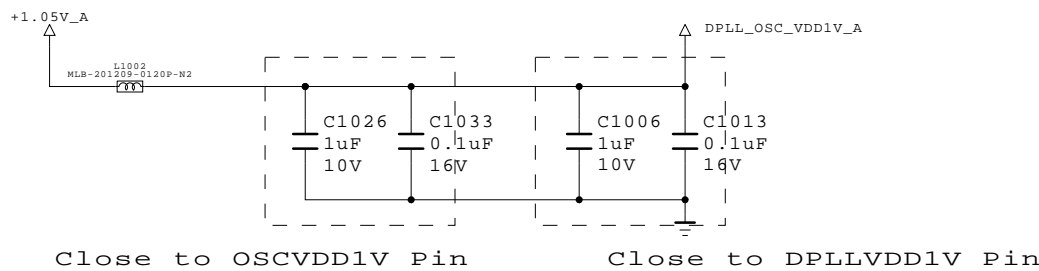
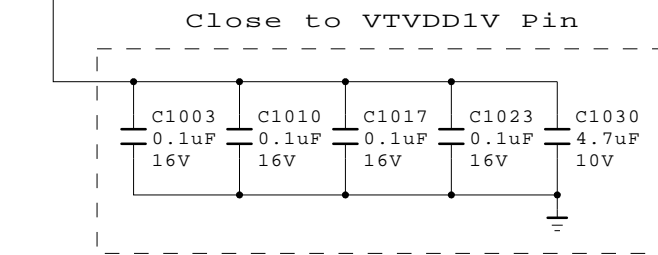
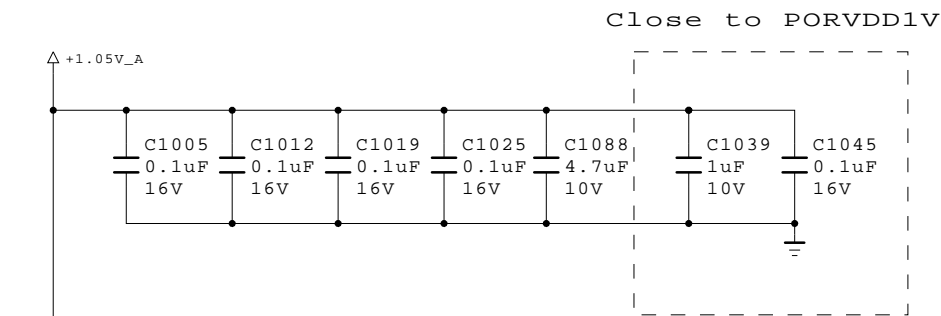
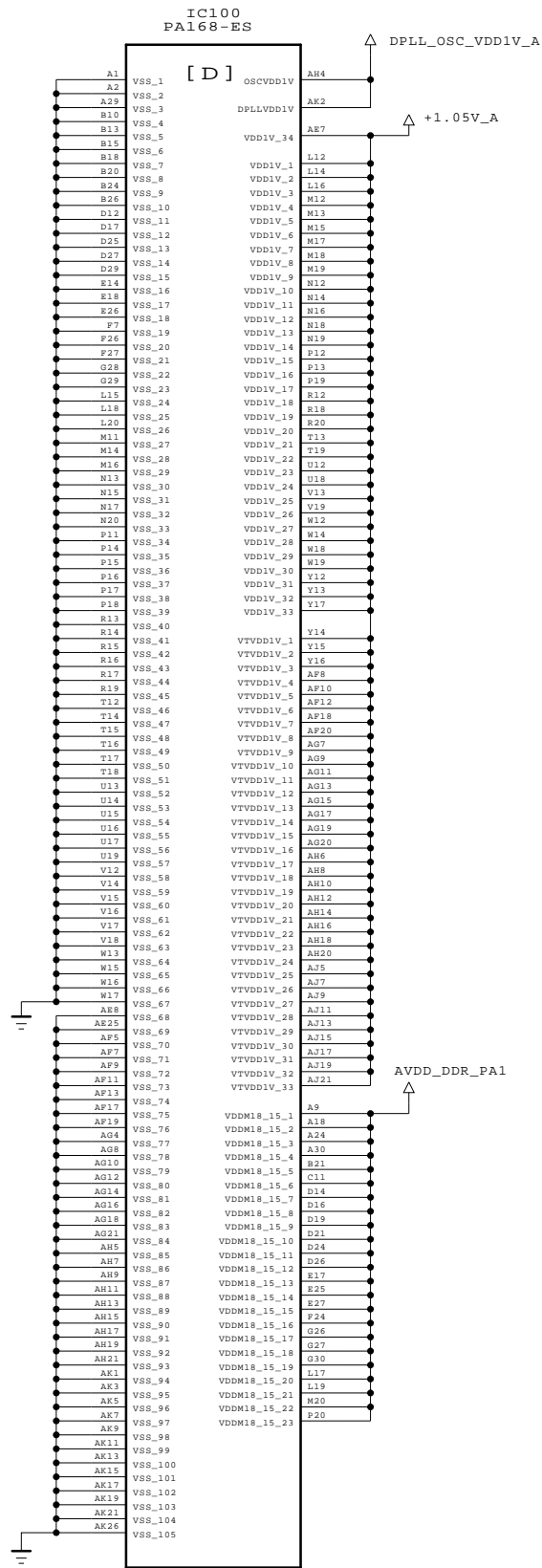
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.



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|       |              |       |            |
|-------|--------------|-------|------------|
| MODEL | EAX65309301  | DATE  | 2013.03.18 |
| BLOCK | P_UART, JTAG | SHEET | 12 / 22    |



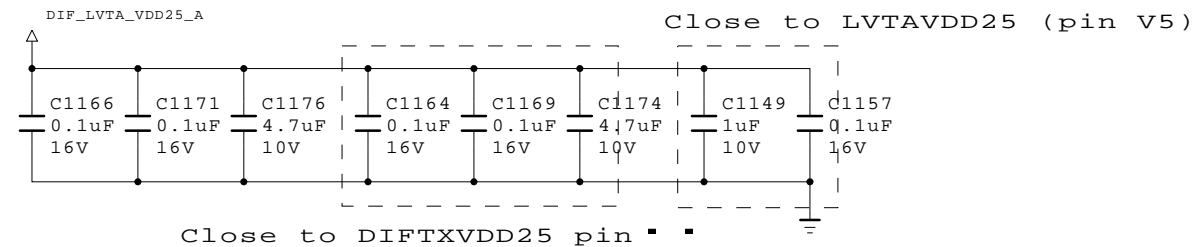
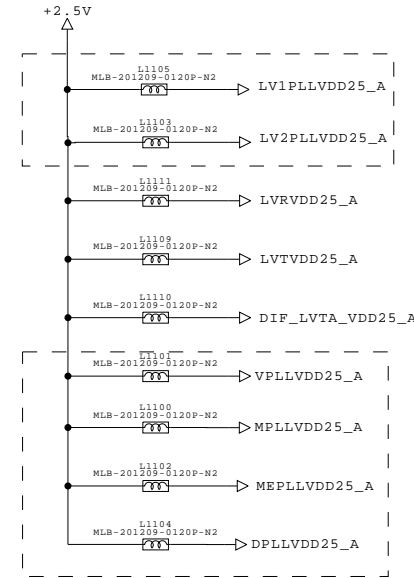
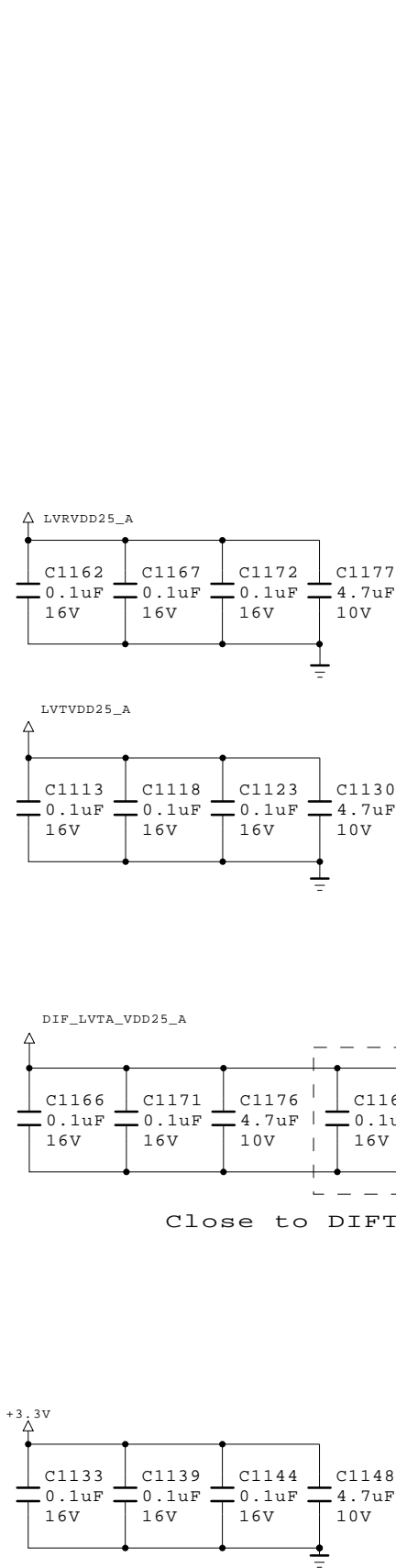
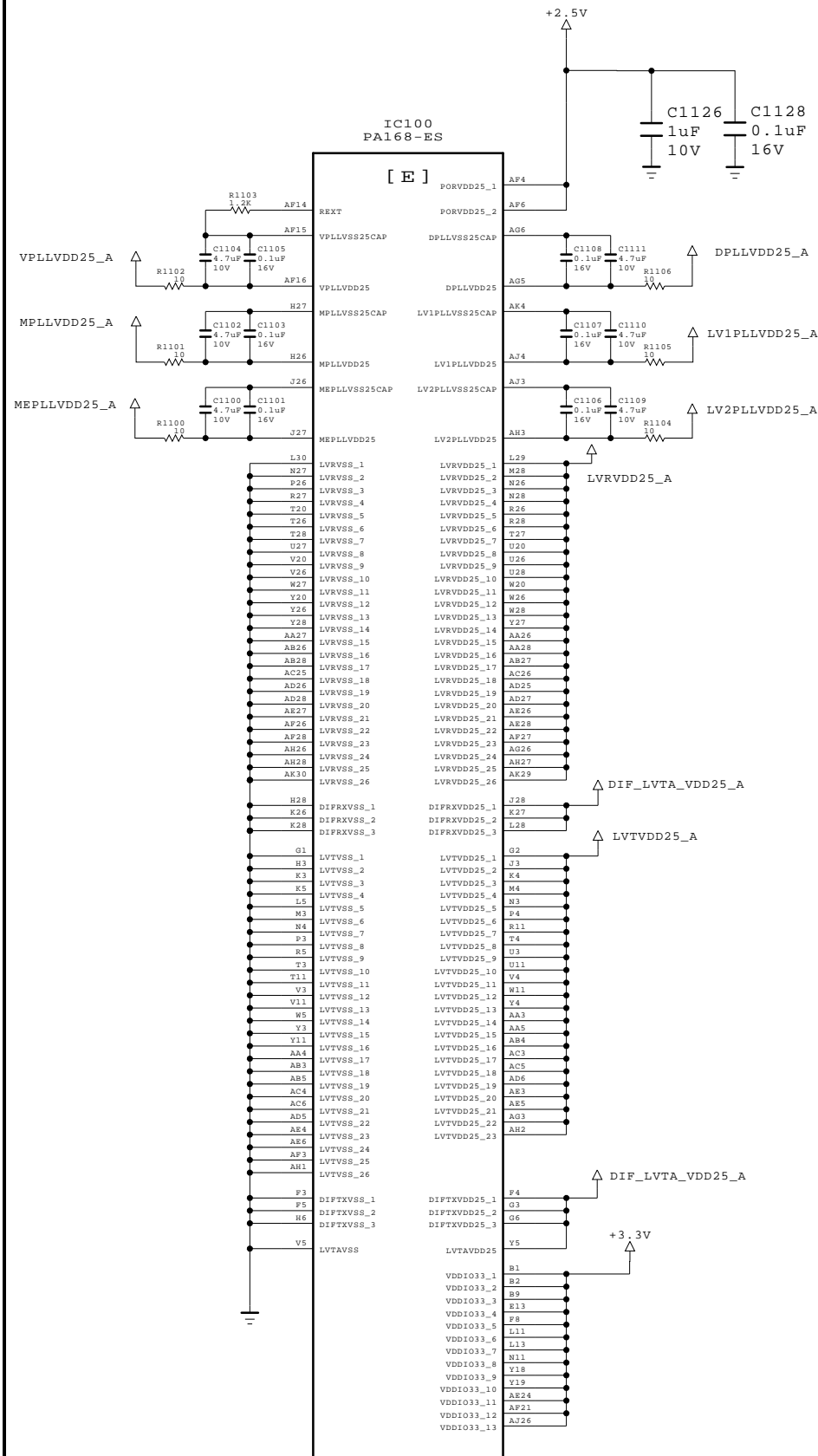




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LGElectronics



|       |                |       |            |
|-------|----------------|-------|------------|
| MODEL | EAX65309301    | DATE  | 2013.03.18 |
| BLOCK | PA168_POWER_A1 | SHEET | 13 / 22    |

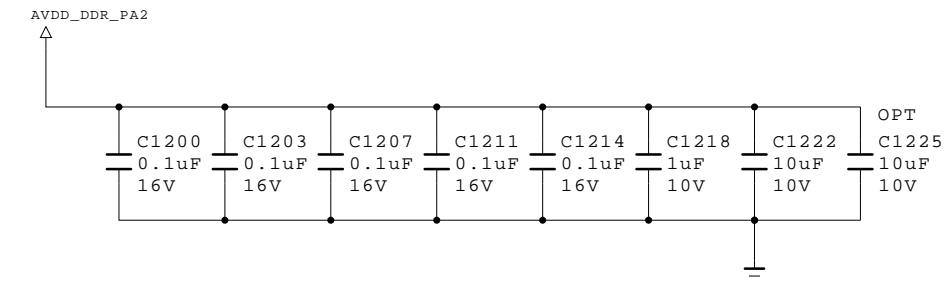
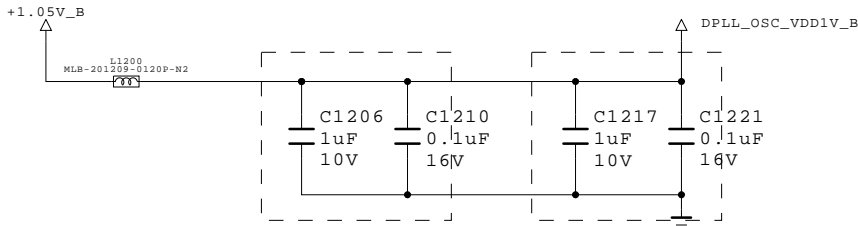
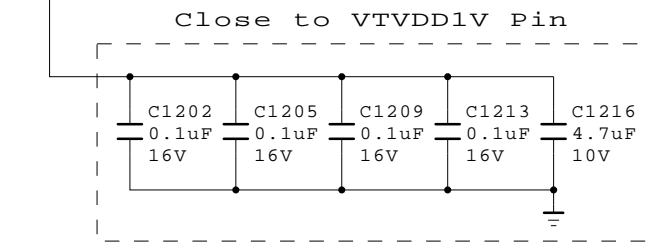
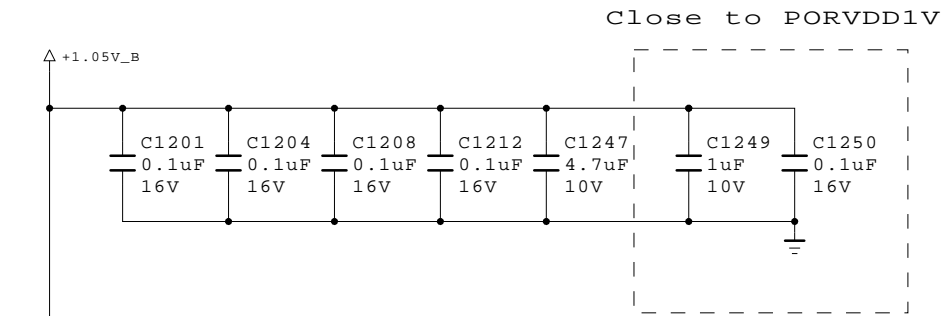
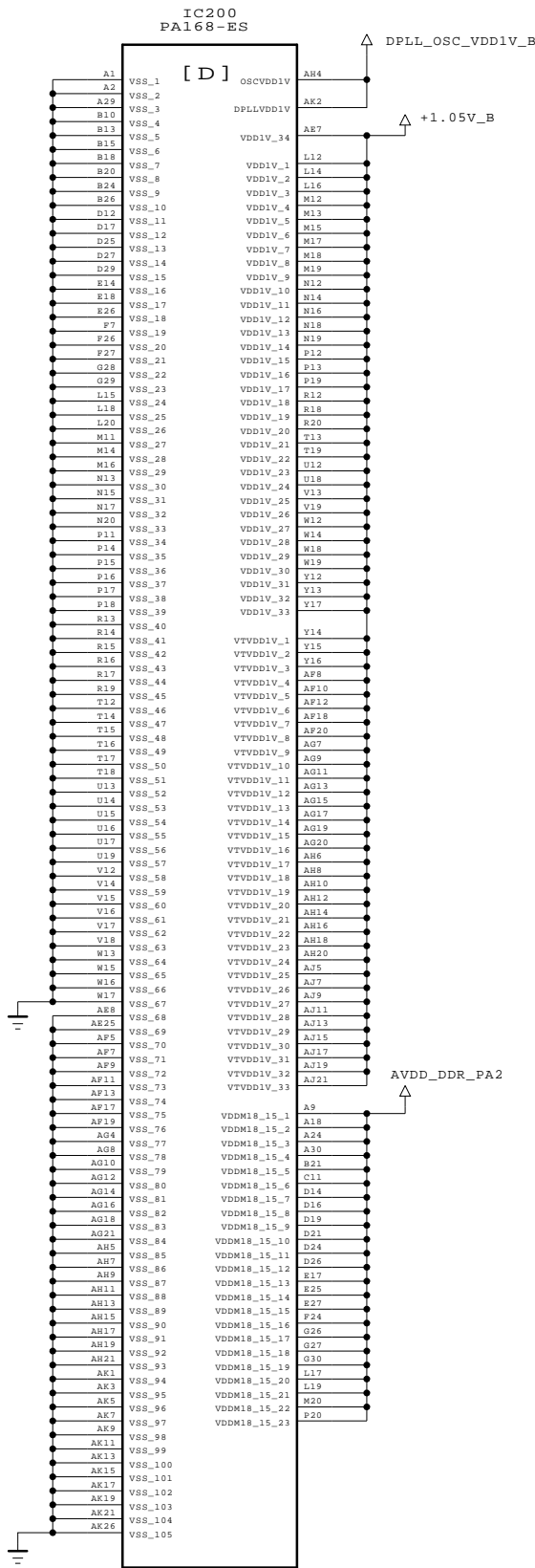




THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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LGElectronics



|       |                |       |            |
|-------|----------------|-------|------------|
| MODEL | EAX65309301    | DATE  | 2013.03.18 |
| BLOCK | PA168_POWER_A2 | SHEET | 14 / 22    |

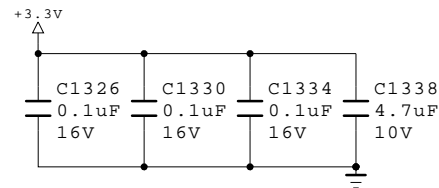
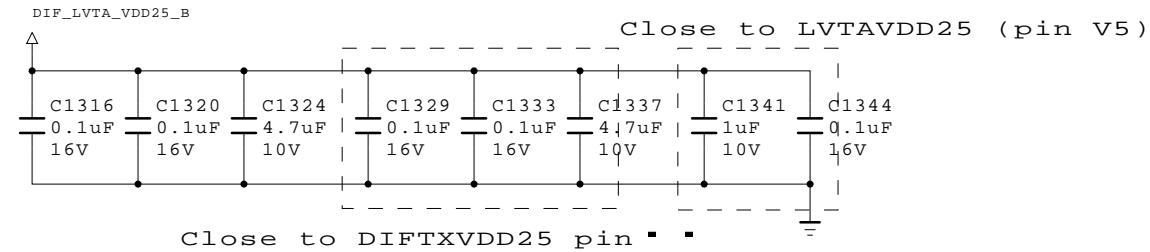
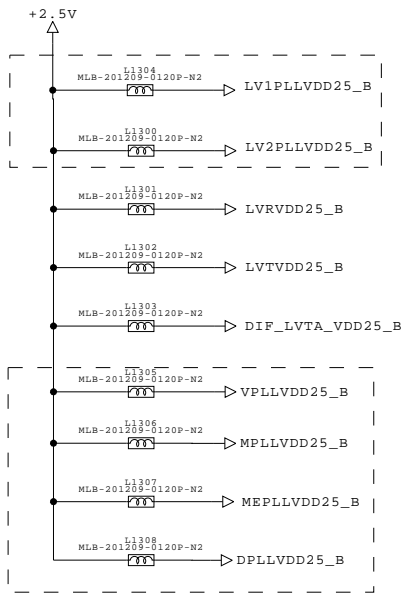
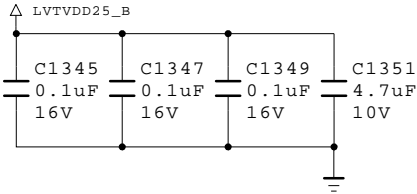
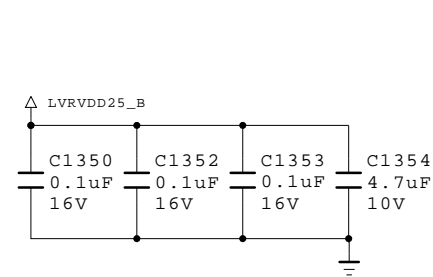
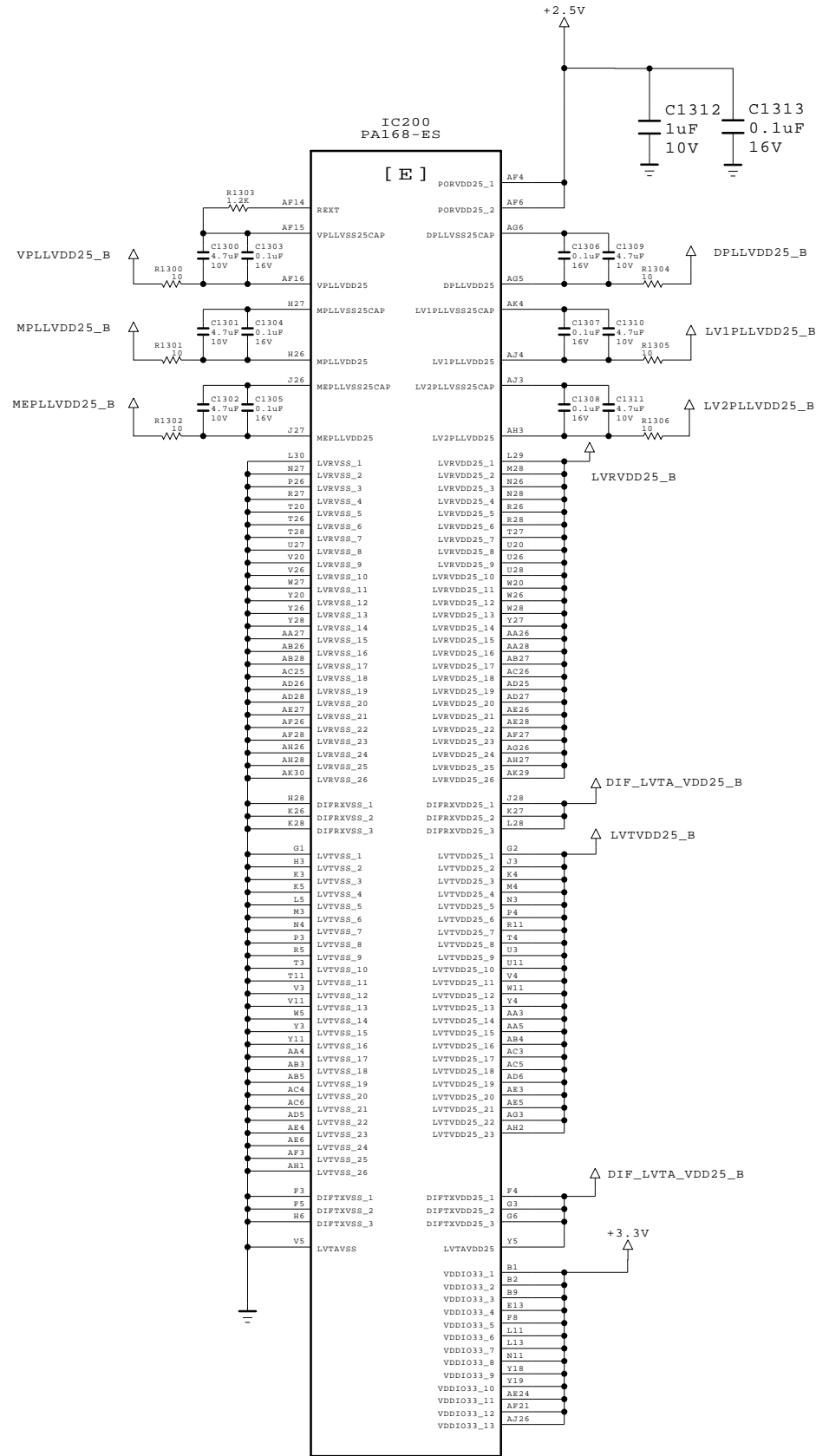




THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics



|       |                |       |            |
|-------|----------------|-------|------------|
| MODEL | EAX65309301    | DATE  | 2013.03.18 |
| BLOCK | PA168_POWER_B1 | SHEET | 15 / 22    |



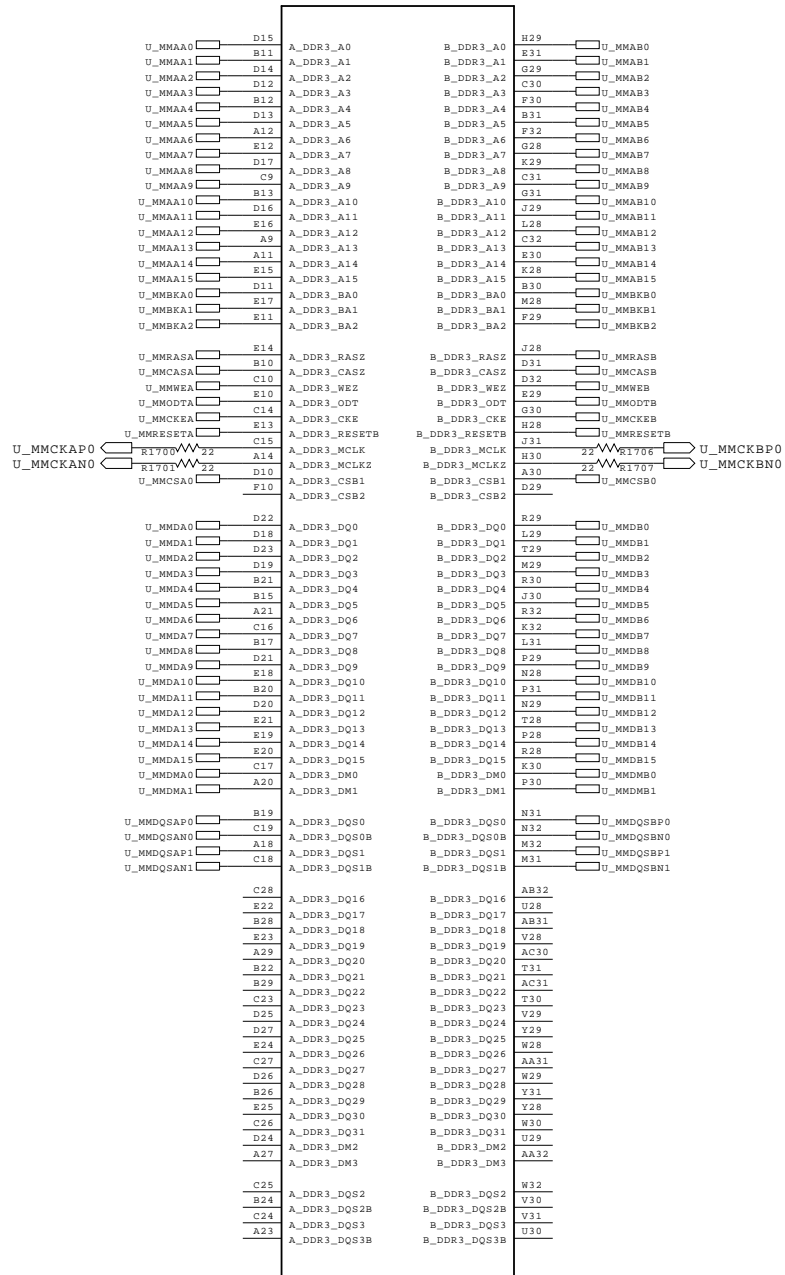
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics

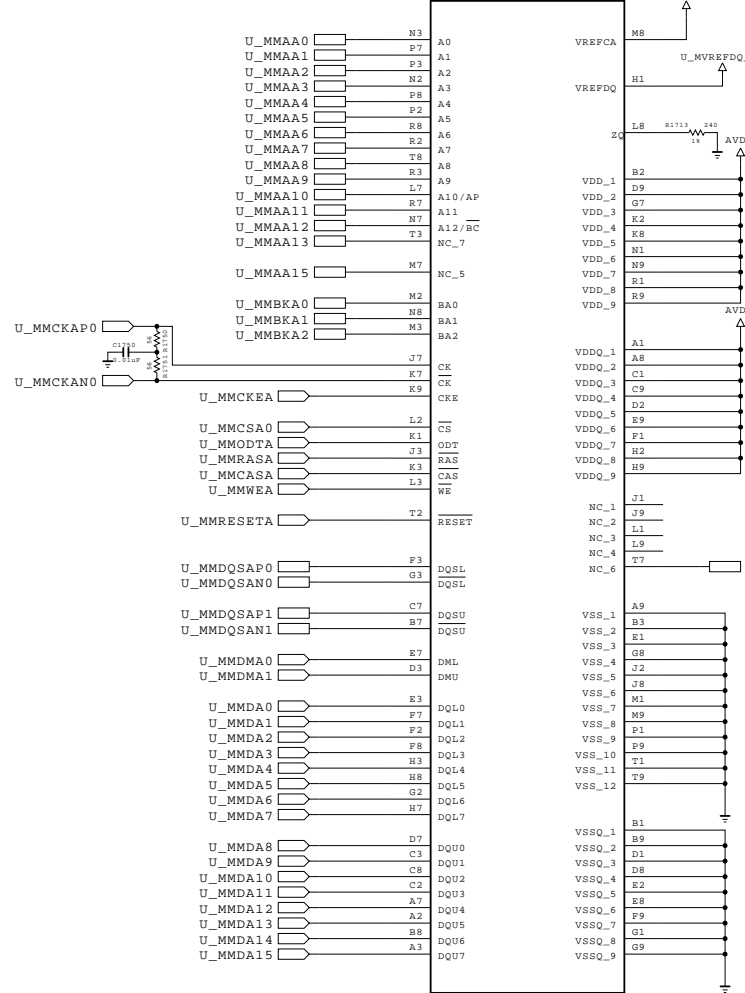


|       |                |       |            |
|-------|----------------|-------|------------|
| MODEL | EAX65309301    | DATE  | 2013.03.18 |
| BLOCK | PA168_POWER_B2 | SHEET | 16 / 22    |

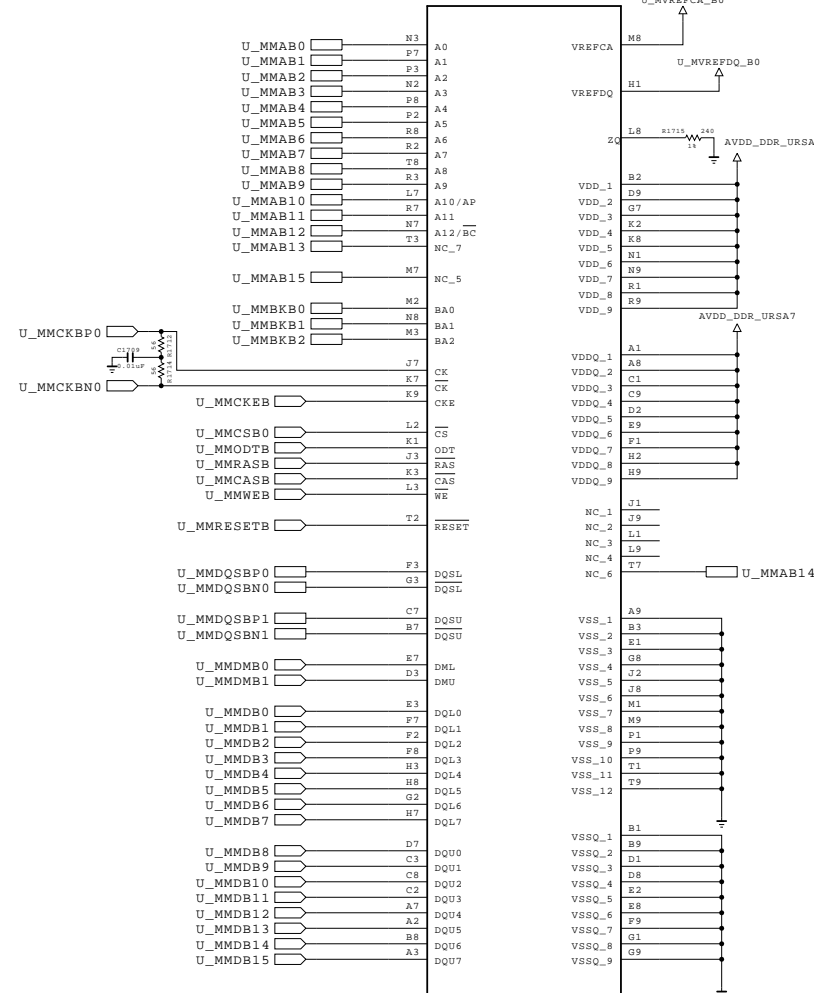
IC2500  
LGE7410



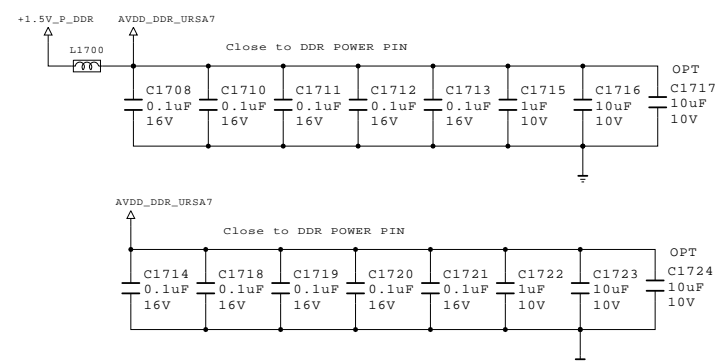
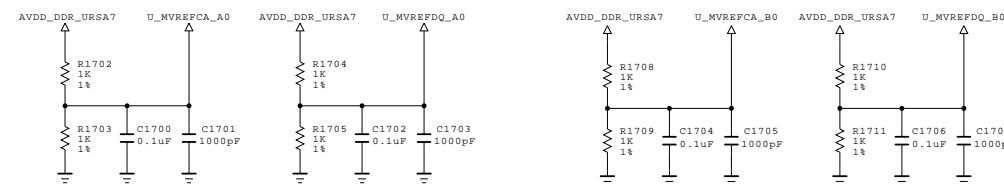
IC2600  
H5TQ1G63EFR-PBC



IC2800  
H5TQ1G63EFR-PBC



DDR PHY VREF

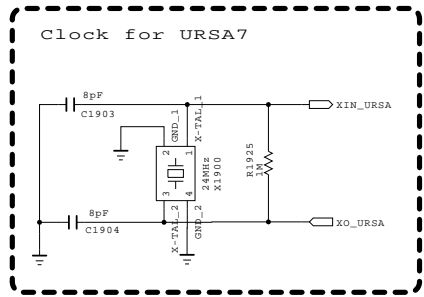


THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

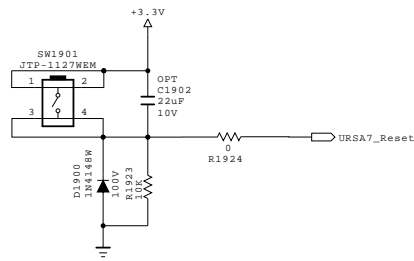
SECRET  
LGElectronics

LG ELECTRONICS

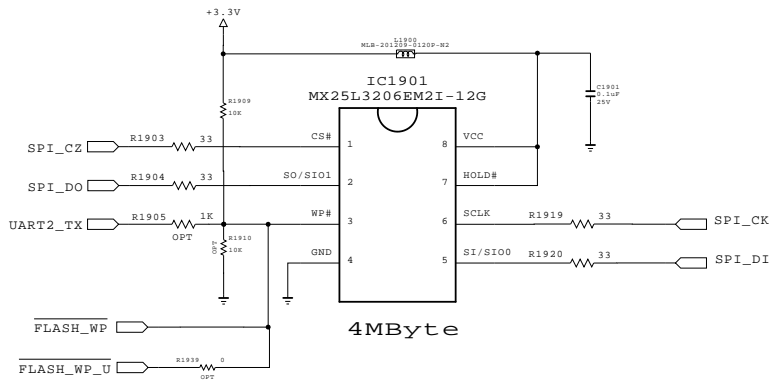
|       |             |       |            |
|-------|-------------|-------|------------|
| MODEL | EAX65309301 | DATE  | 2013.03.18 |
| BLOCK | URSA7_DDR_A | SHEET | 17 / 22    |



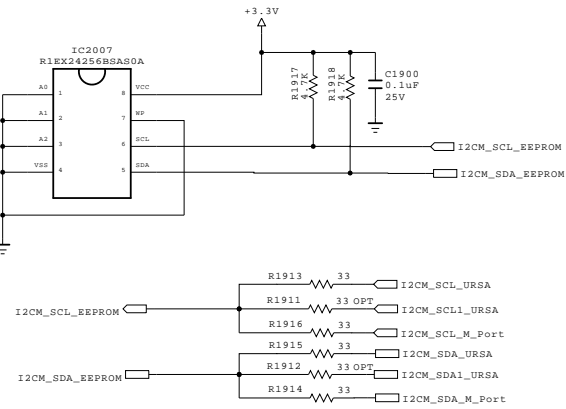
### URSA Reset



### SPI Flash

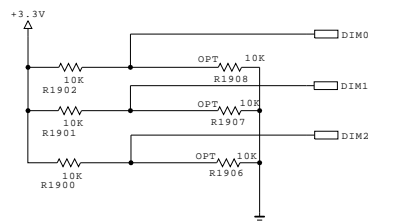


### I2C EEPROM

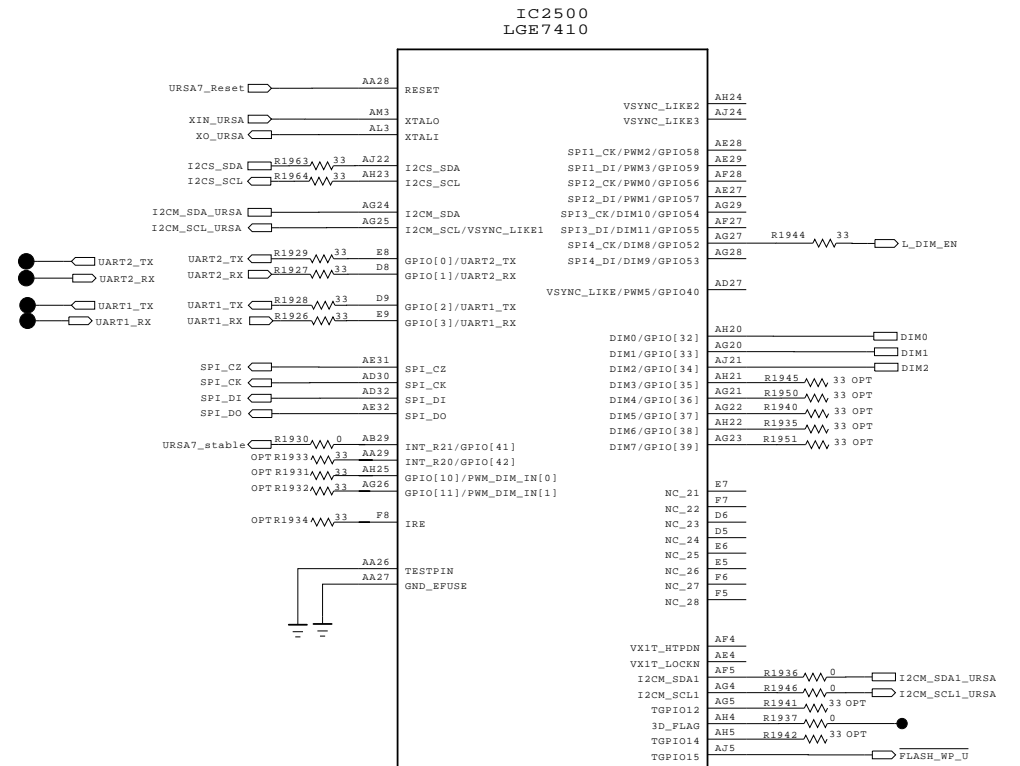
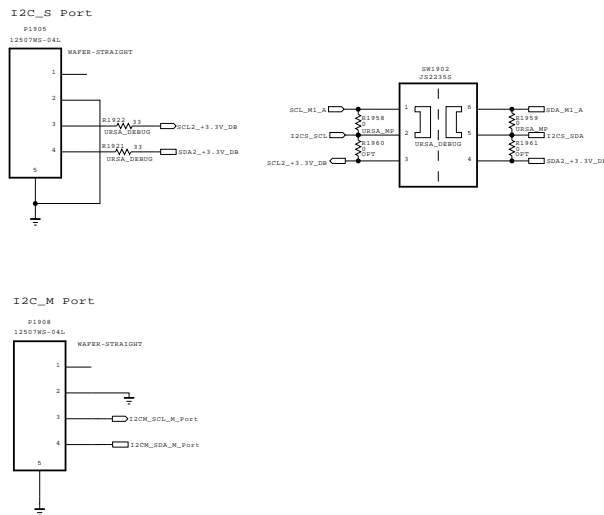


### Chip Config

Debug/ISP ADDR  
Slabe (Debug Port: OXB4, ISP: OX98)  
CHIP\_CONF: {DIM0, DIM1, DIM2}  
CHIP\_CONF=3'd7:111:boot from SPI Flash



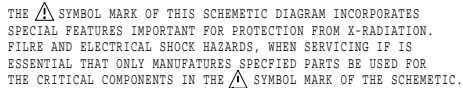
### Debugging for URSA

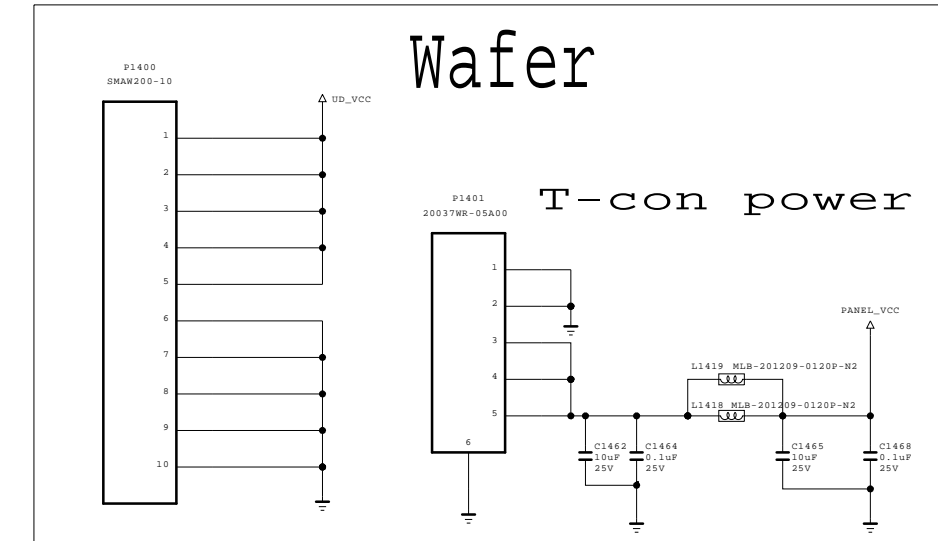
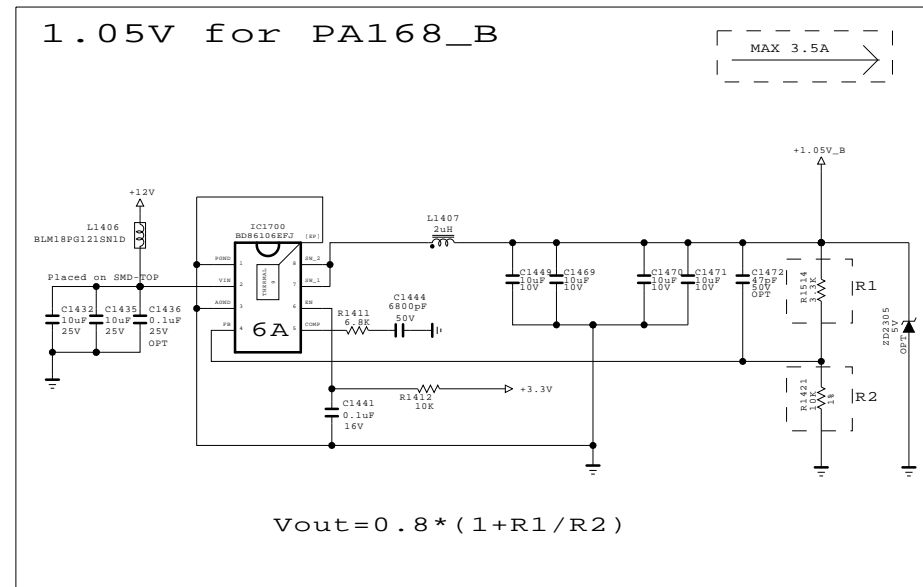
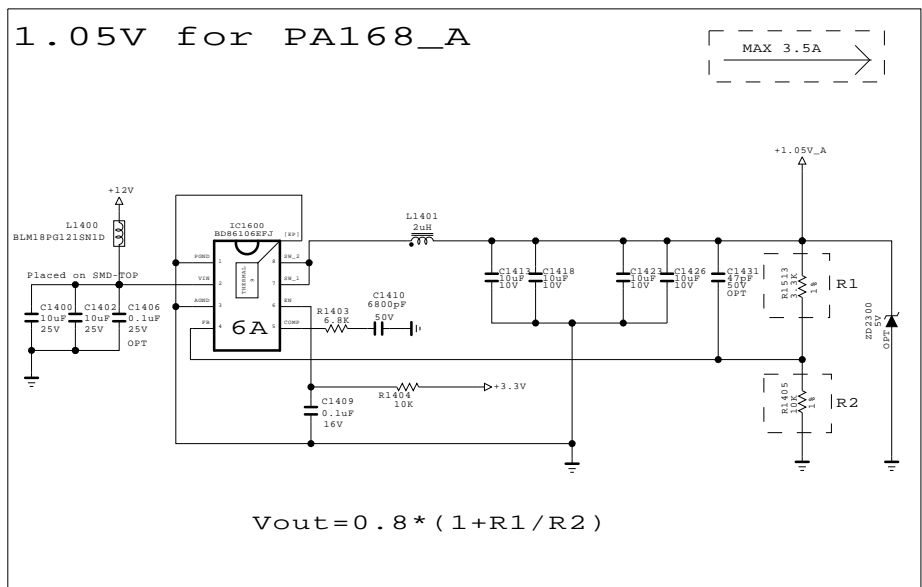
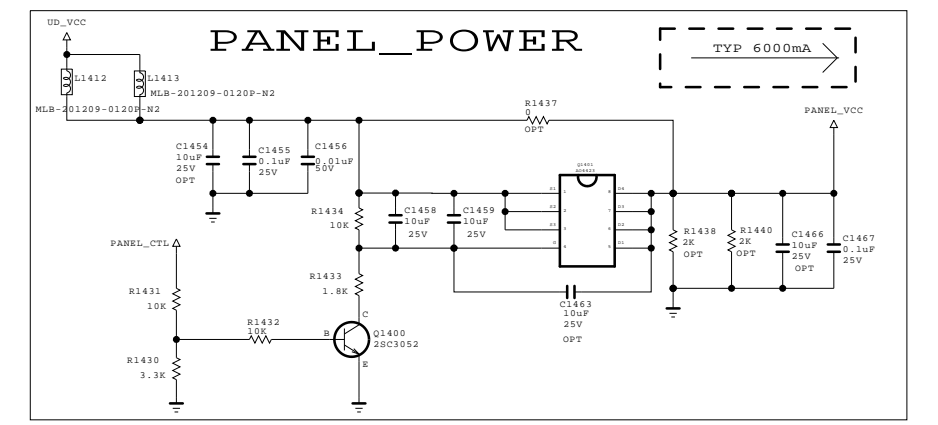
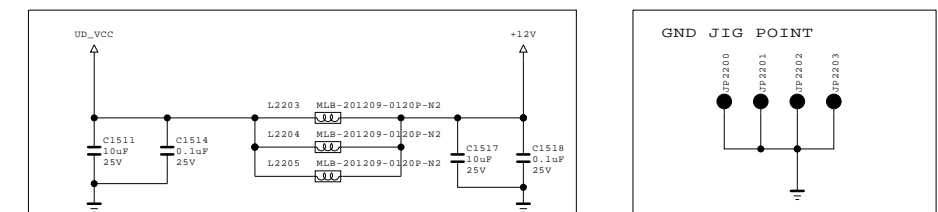
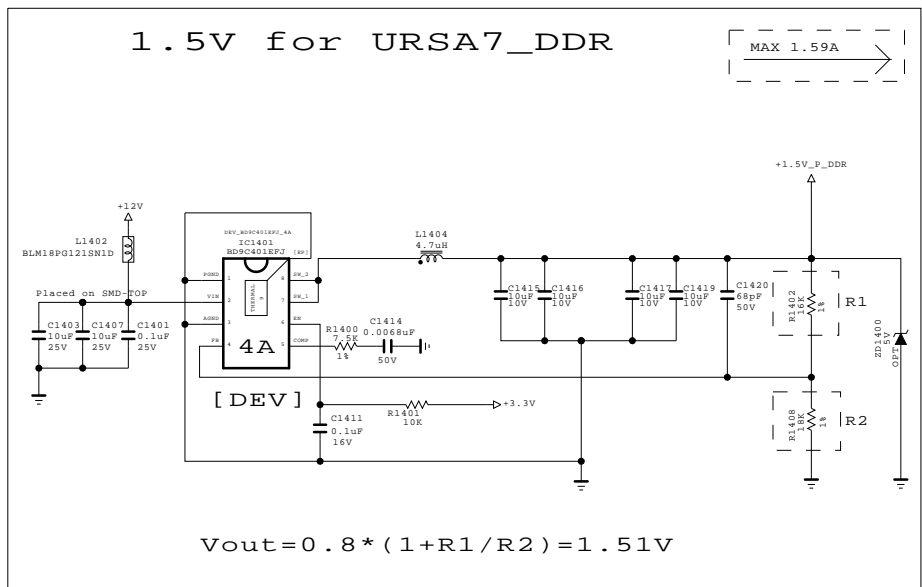
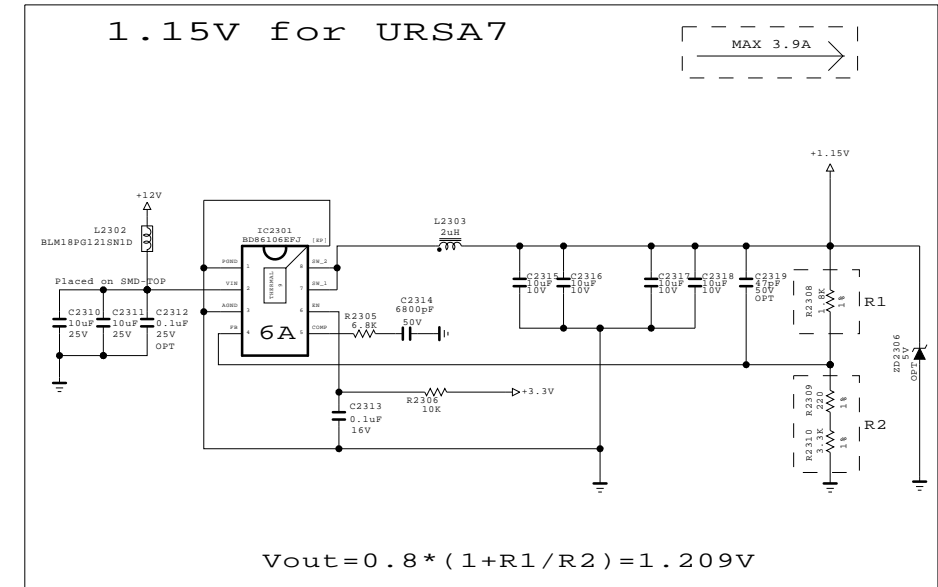
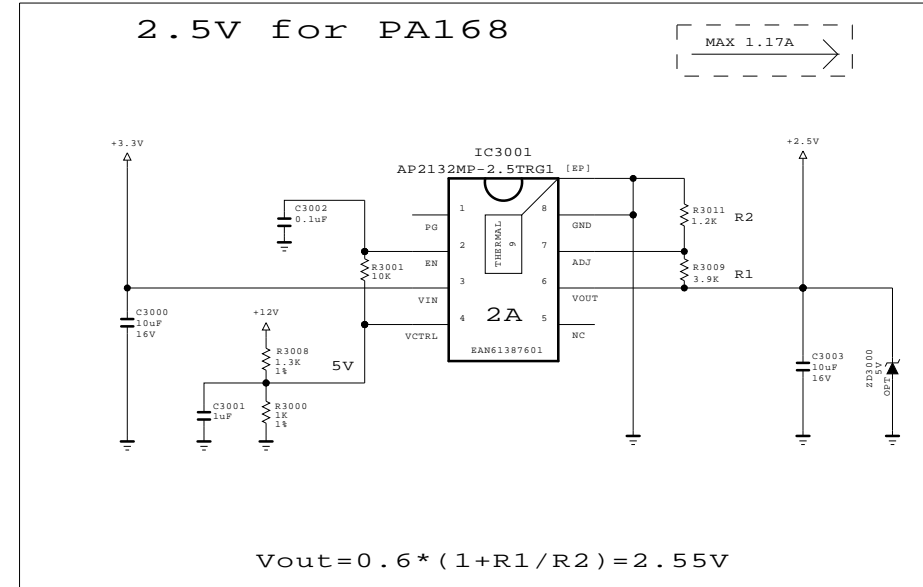
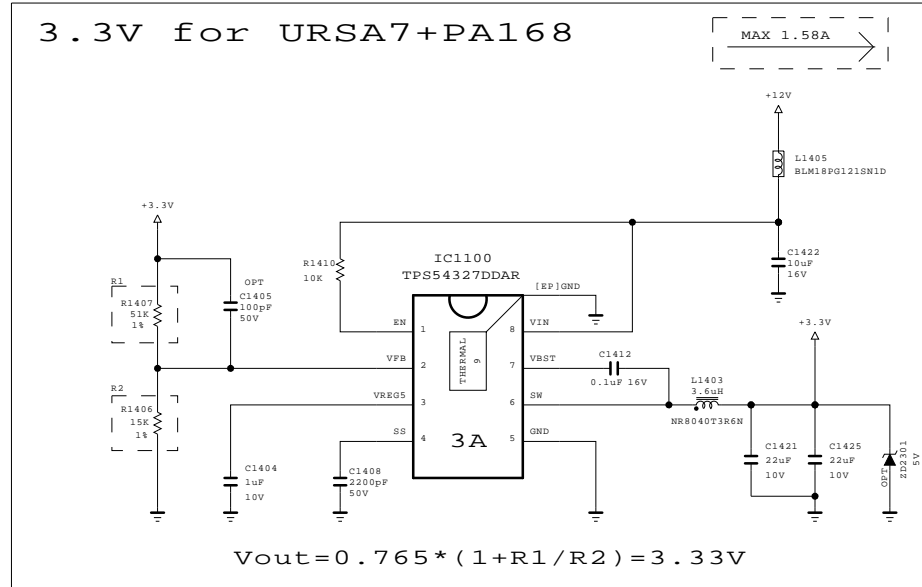


### IC2500 LGE7410

AH28 GPIO[8]/HDMIRX\_CEC  
AH29 GPIO[9]/HDMIRX\_HPD  
AJ27 GPIO[6]/DDCA\_DA  
AJ28 GPIO[7]/DDCA\_DA  
AH32 HDMI\_RXCP  
AH31 HDMI\_RXCN  
AG32 HDMI\_RX0P  
AG30 HDMI\_RX0N  
AF30 HDMI\_RX1P  
AG31 HDMI\_RX1N  
AE30 HDMI\_RX2P  
AF31 HDMI\_RX2N

AH26 GPIO[4]/HDMITX\_CEC  
AH27 GPIO[5]/HDMITX\_HPD  
AJ25 HDMITX\_SCL  
AJ26 HDMITX\_SDA  
AL31 HDMITX\_CLKP  
AM31 HDMITX\_CLKN  
AK31 HDMI\_TX0P  
AL32 HDMI\_TX0N  
AJ30 HDMI\_TX1P  
AK32 HDMI\_TX1N  
AH30 HDMI\_TX2P  
AJ31 HDMI\_TX2N

LGE Internal Use Only



THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics



|       |             |       |            |
|-------|-------------|-------|------------|
| MODEL | EAX65309301 | DATE  | 2013.03.18 |
| BLOCK | DC-DC POWER | SHEET | 22 / 22    |





# **LCD TV Repair Guide**

**`13 years New Models**

**< Applicable Model >  
XXLA965V-ZA**

# Main PCB

XXLA965V-ZA

Woofer



Power  
From PSU



FRC B/D (ULTRA HD)

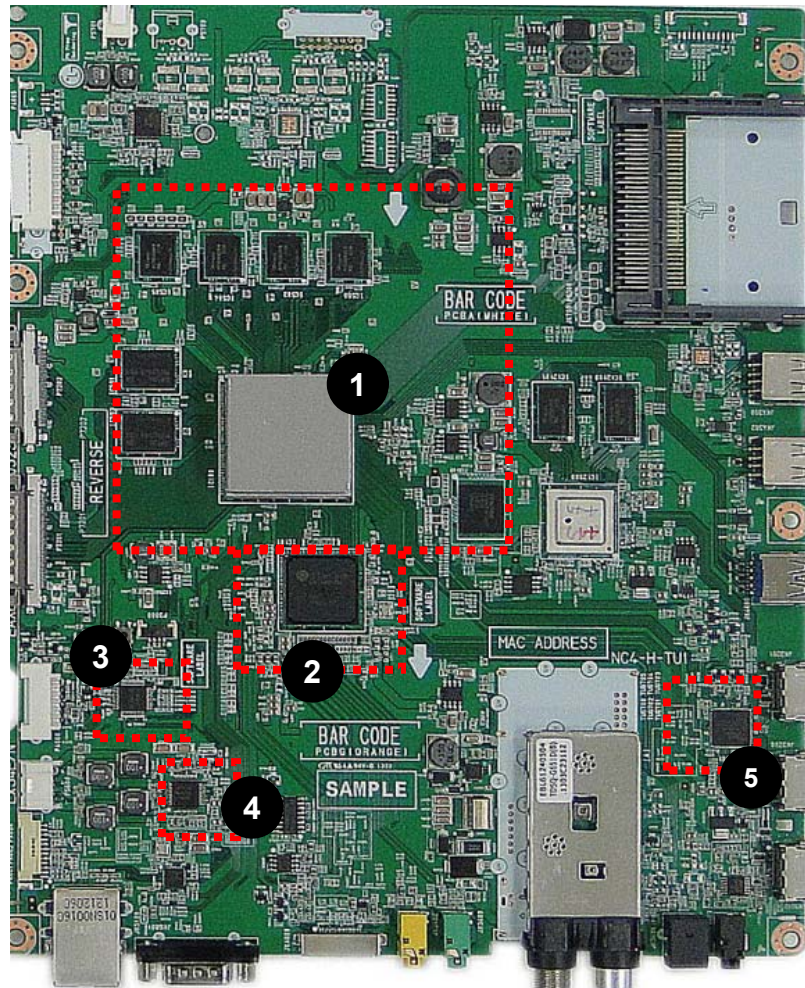


wifi  
Motion assy

Front Spk



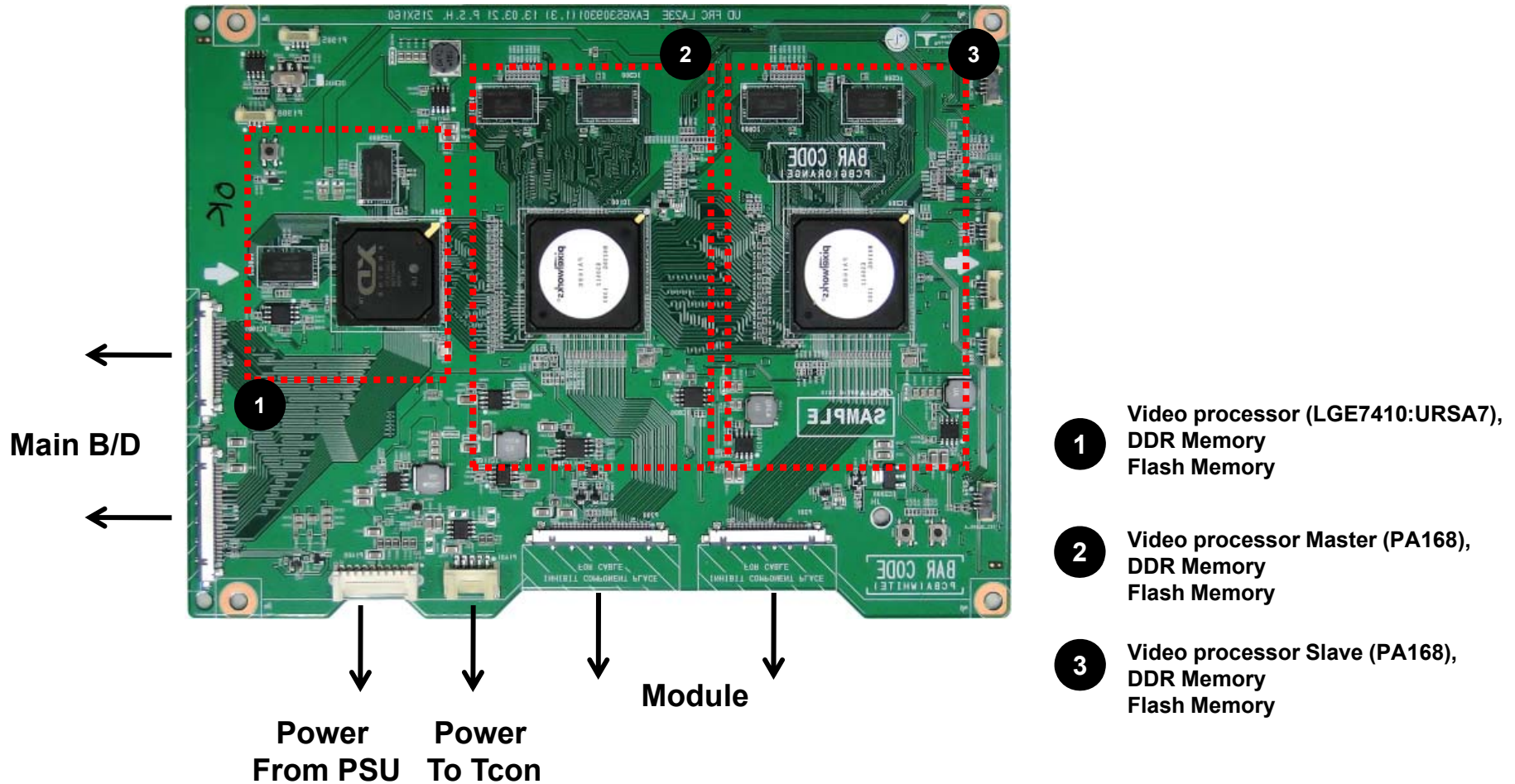
Local Key +IR



- 1 Main processor\_Digital(LG1152D),  
DDR Memory  
eMMC Memory
- 2 Main processor\_analog(LG1152A)
- 3 Micom for Key/IR sensing
- 4 Audio AMP (50W)
- 5 HDMI switch

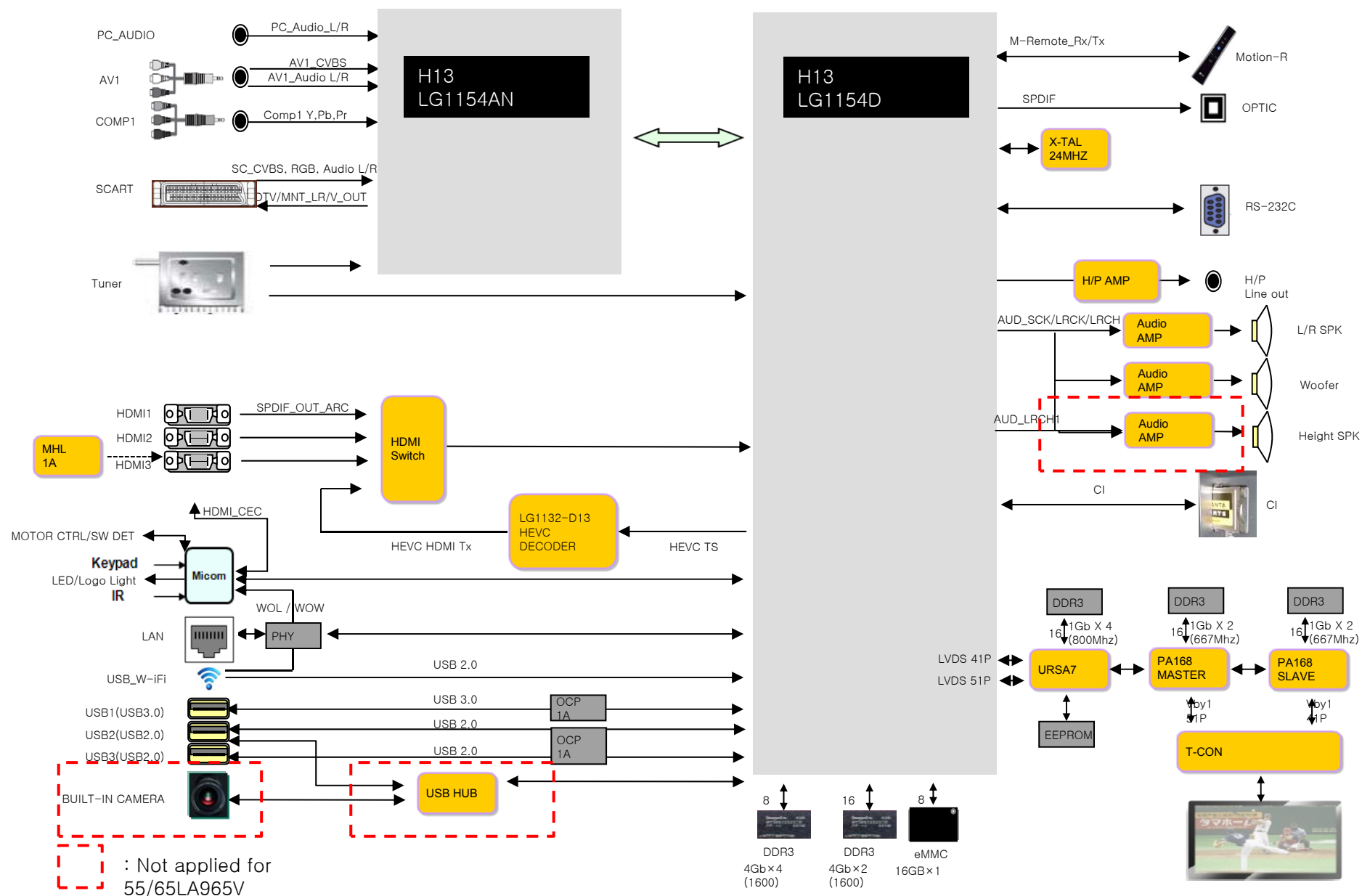
# FRC PCB(ULTRA HD)

## XXLA965V-ZA



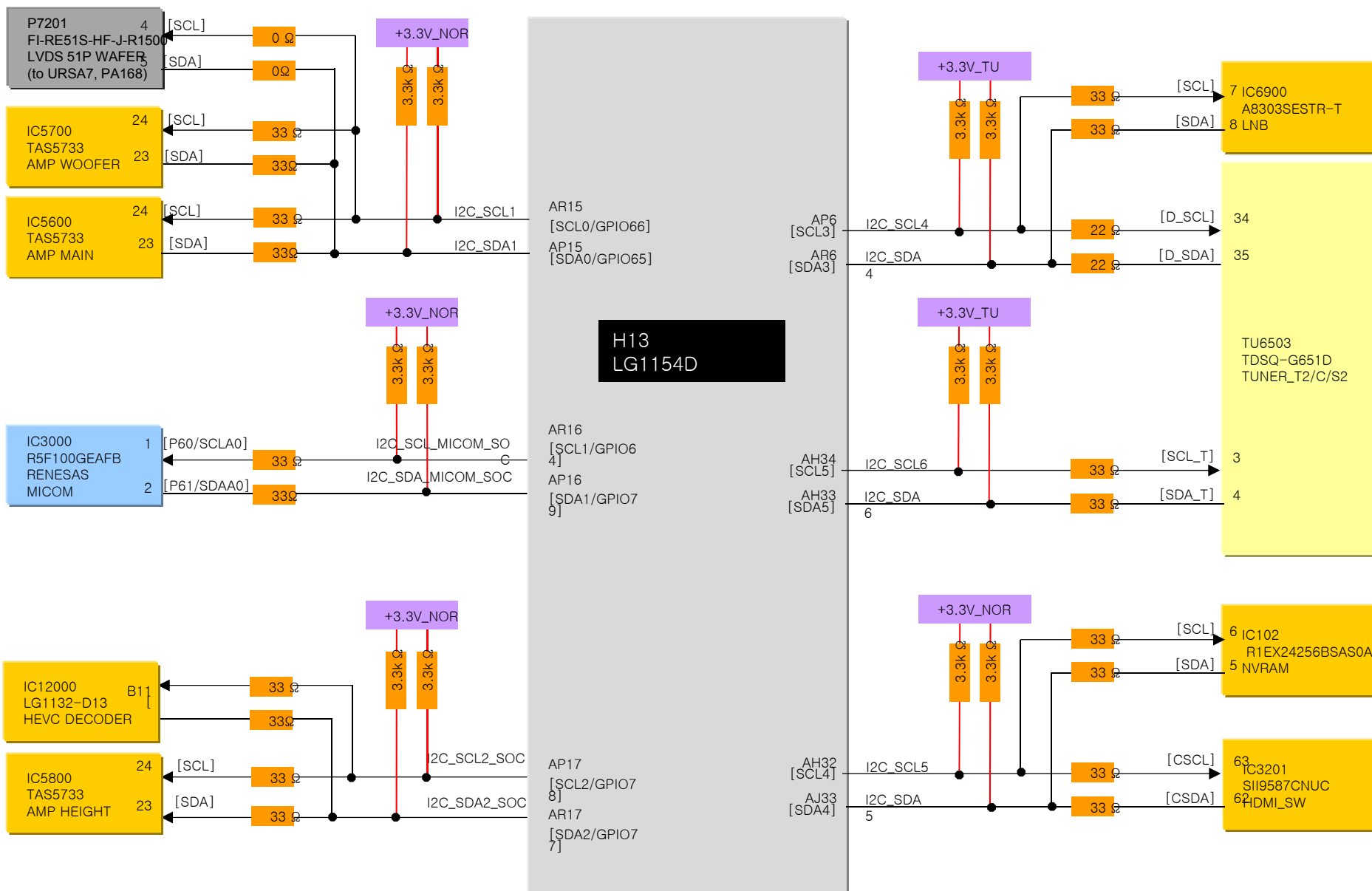
# H13 Block diagram

## External I/O



# H13 Block diagram

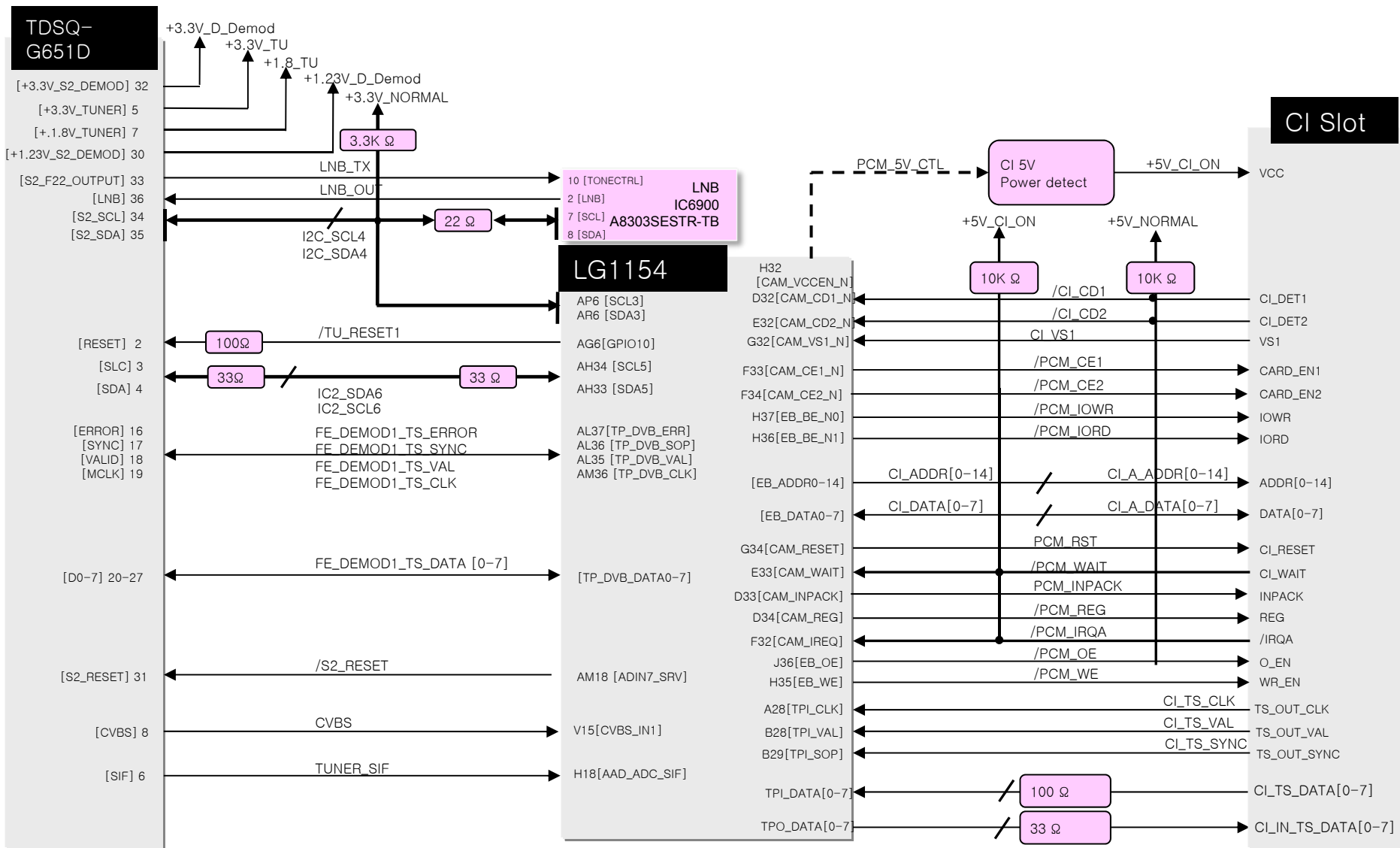
## I2C Map





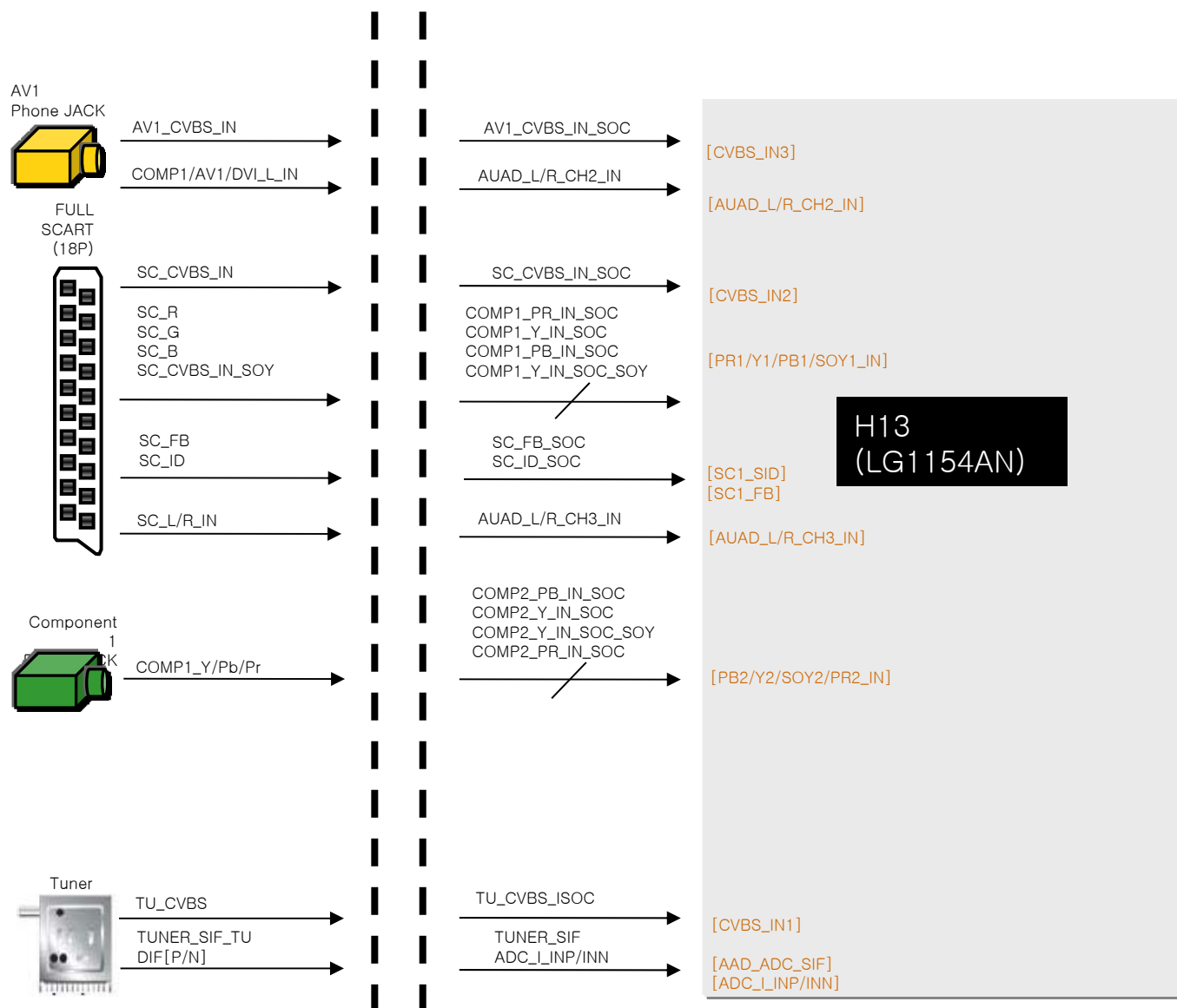
# H13 Block diagram

## Tuner Block



# H13 Block diagram

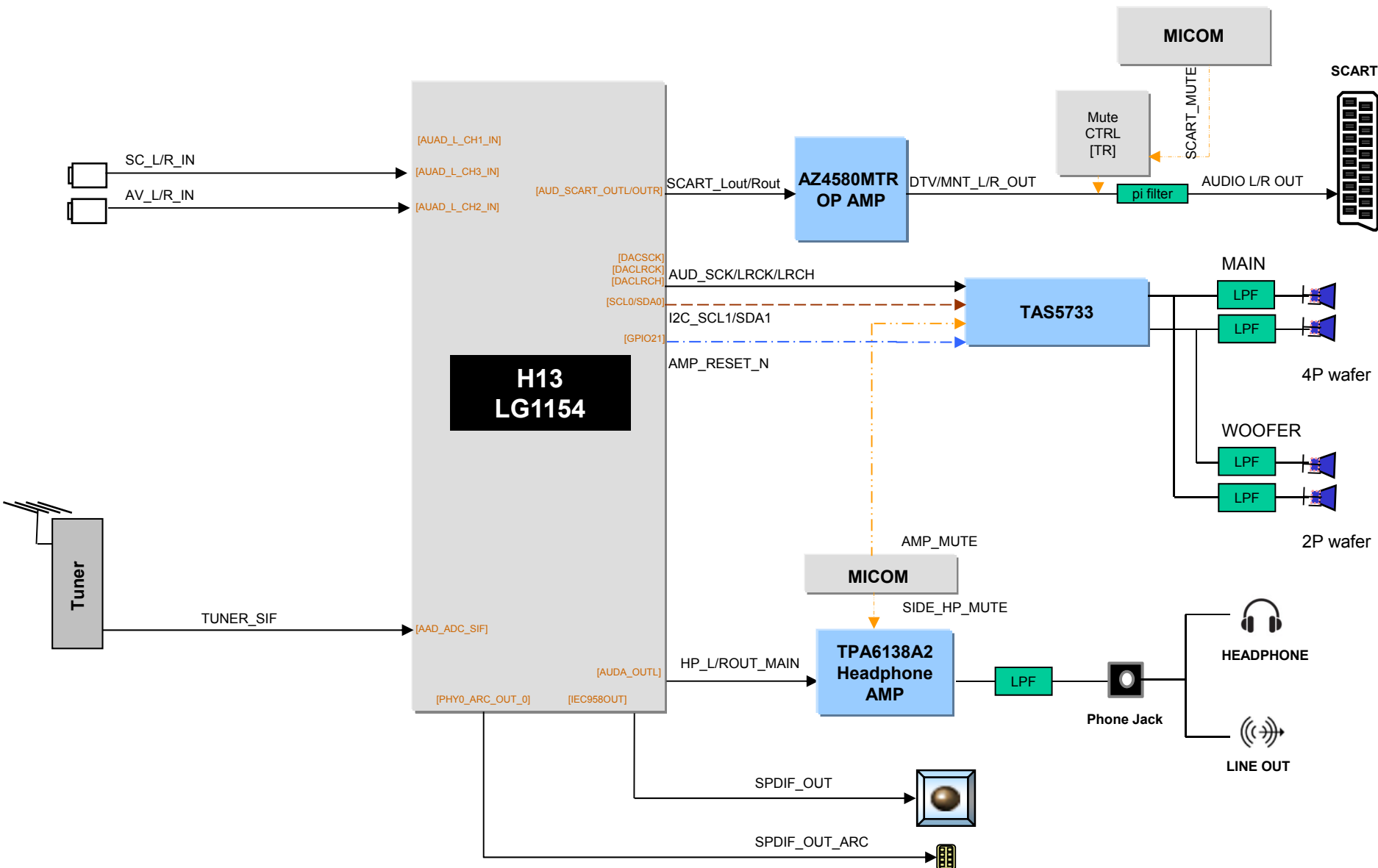
## Analogue Input



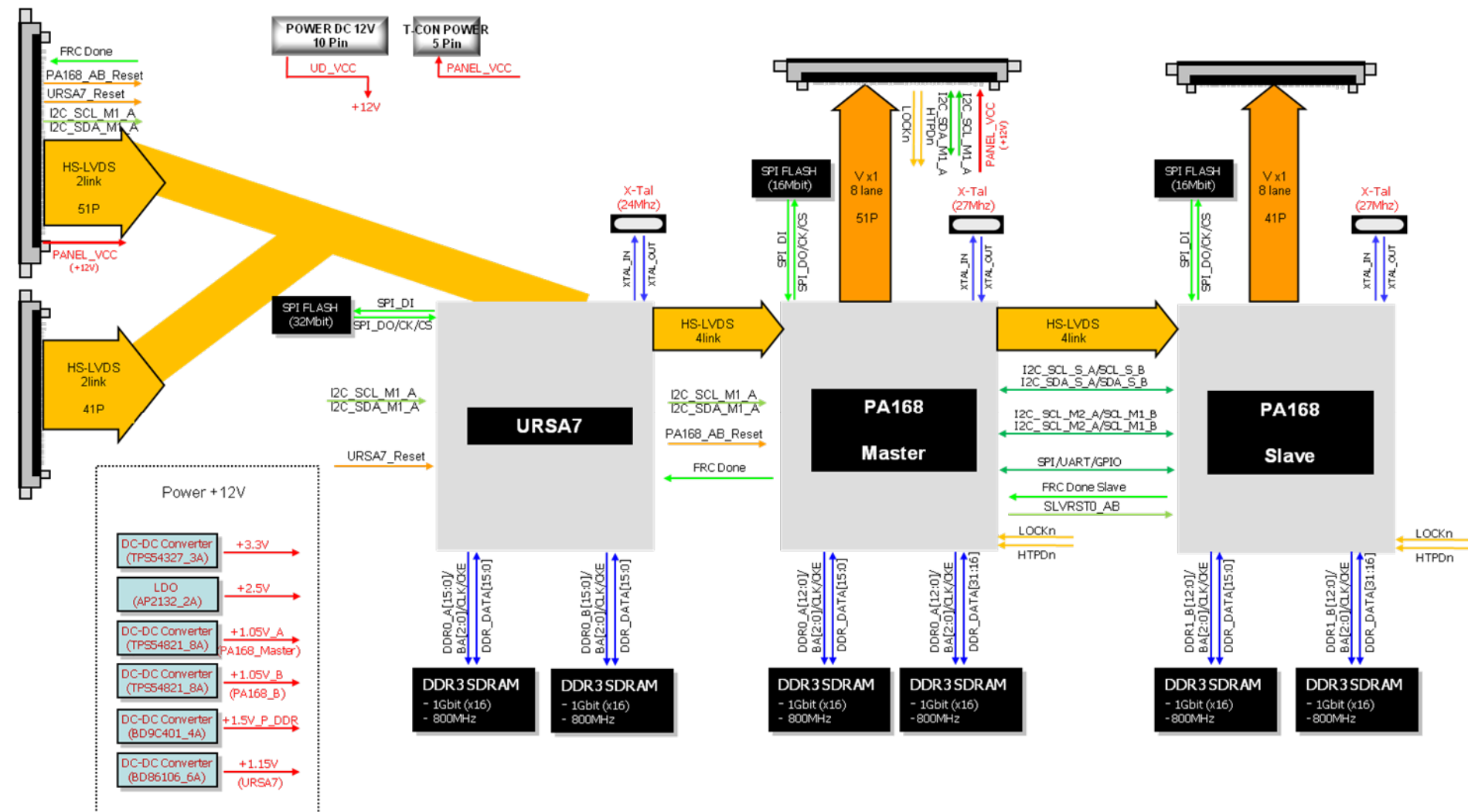


# H13 Block diagram

## Audio I/O

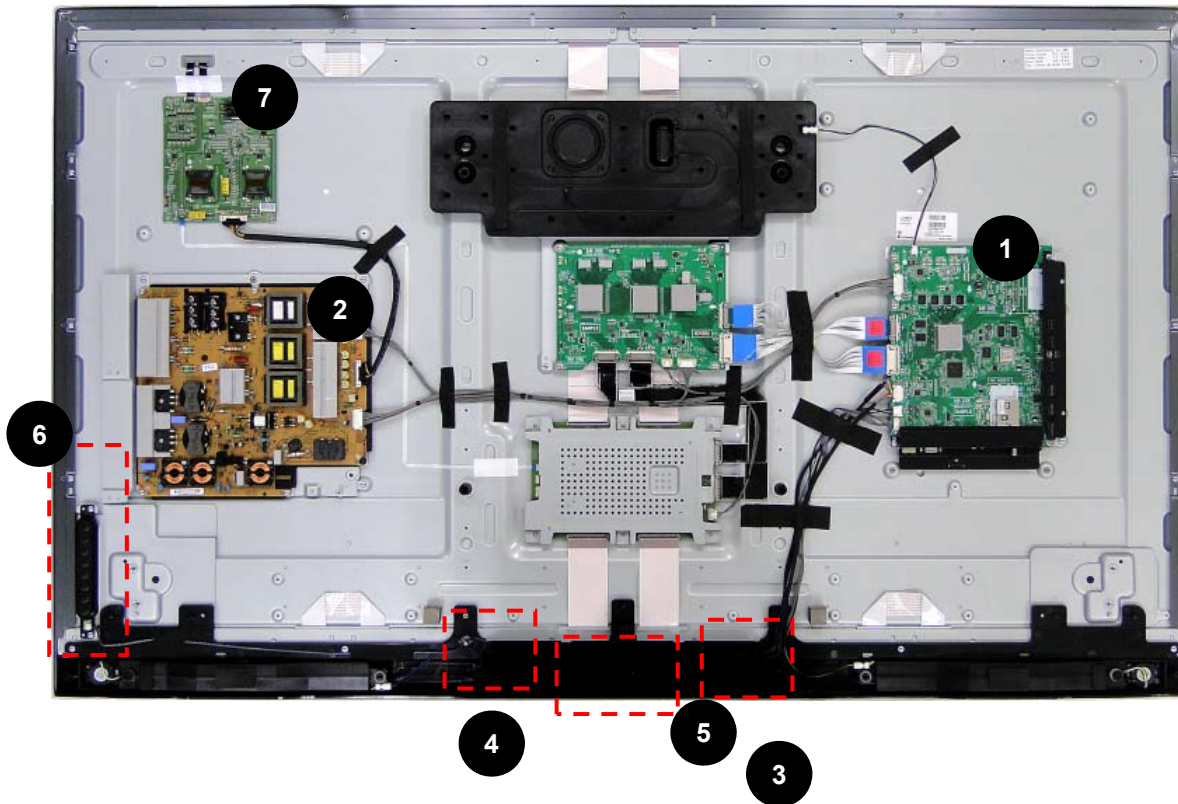


# FRC B/D (ULTRA HD) Block diagram



# Interconnection - 1

## XXLA965V-ZA



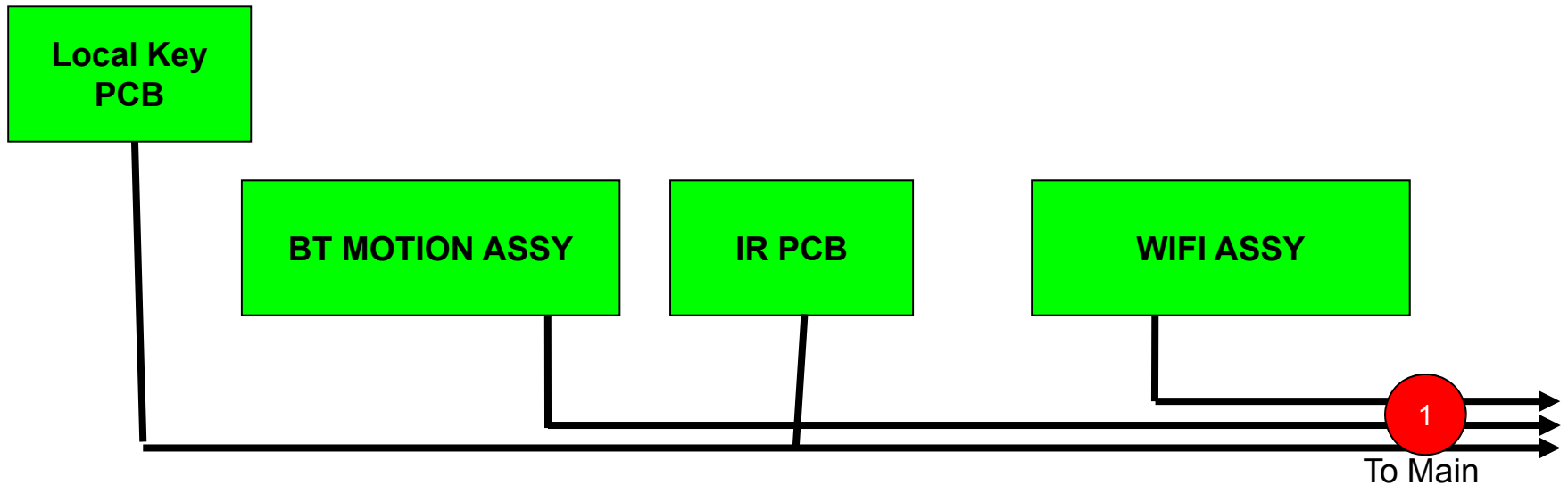
### [PCBs]

- 1 Main PCB
- 2 PSU
- 3 WIFI ASSY
- 4 BT MOTION ASSY
- 5 IR PCB
- 6 Local Key
- 7 LED Driver

# Interconnection – sub PCB( XXLA965V Series )



- 4 BT MOTION ASSY      5 IR Key PCB      3 WIFI ASSY



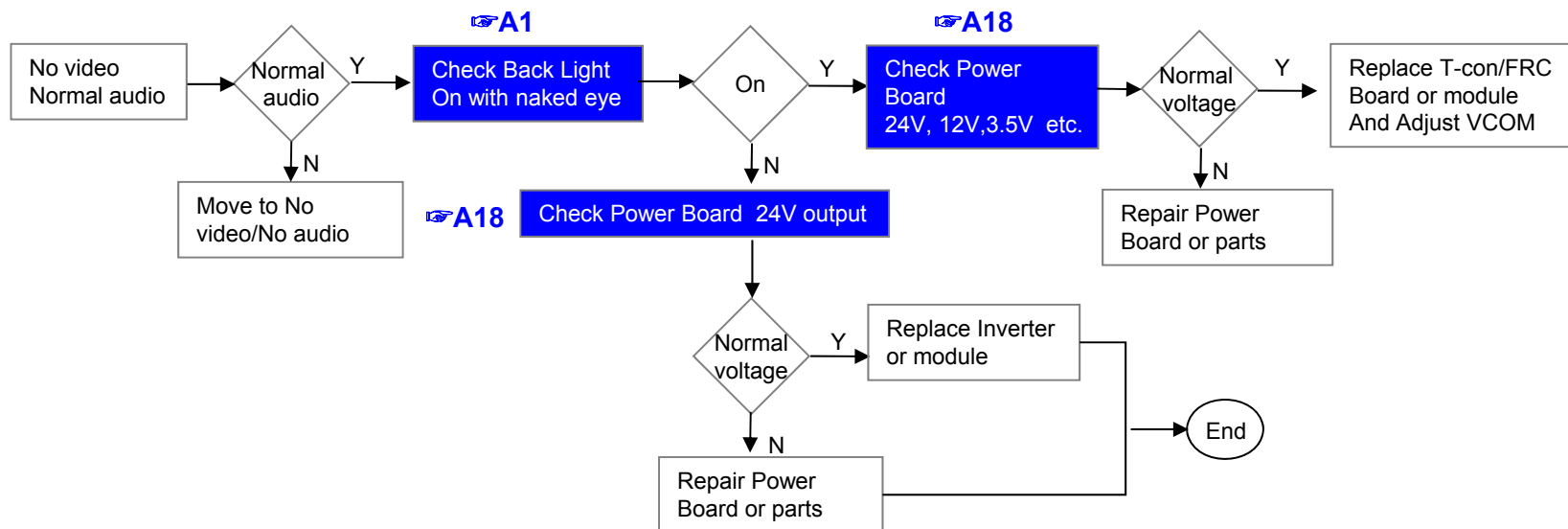
# Contents of LCD TV Standard Repair Process

| No. | Error symptom (High category) | Error symptom (Mid category)                                                     | Page | Remarks |
|-----|-------------------------------|----------------------------------------------------------------------------------|------|---------|
| 1   | A. Video error                | No video/Normal audio                                                            | 1    |         |
| 2   |                               | No video/No audio                                                                | 2    |         |
| 3   |                               | Picture broken/ Freezing                                                         | 3    |         |
| 4   |                               | Color error                                                                      | 4    |         |
| 5   |                               | Vertical/Horizontal bar, residual image, light spot, external device color error | 5    |         |
| 6   | B. Power error                | No power                                                                         | 6    |         |
| 7   |                               | Off when on, off while viewing, power auto on/off                                | 7    |         |
| 8   | C. Audio error                | No audio/Normal video                                                            | 8    |         |
| 9   |                               | Wrecked audio/discontinuation/noise                                              | 9    |         |
| 10  | D. Function error             | Remote control & Local switch checking                                           | 10   |         |
| 11  |                               | MR13 operating checking                                                          | 11   |         |
| 12  |                               | Wifi operating checking                                                          | 12   |         |
| 13  |                               | Camera operating checking                                                        | 13   |         |
| 14  |                               | External device recognition error                                                | 14   |         |
| 15  | E. Noise                      | Circuit noise, mechanical noise                                                  | 15   |         |
| 16  | F. Exterior error             | Exterior defect                                                                  | 16   |         |

**First of all, Check whether there is SVC Bulletin in GCSC System for these model.**

| LCD TV | Error symptom | A. Video error         | Established date | 2013.01.31 |      |
|--------|---------------|------------------------|------------------|------------|------|
|        |               | No video/ Normal audio | Revised date     |            | 1/16 |

**First of all, Check whether all of cables between board is inserted properly or not.**  
**(Main B/D ↔ Power B/D, LVDS Cable, Speaker Cable, IR B/D Cable,,)**



※Precaution A4 & A2

Always check & record S/W Version and White Balance value before replacing the Main Board

Replace Main Board

Re-enter White Balance value

LCD TV

Error  
symptom

## A. Video error

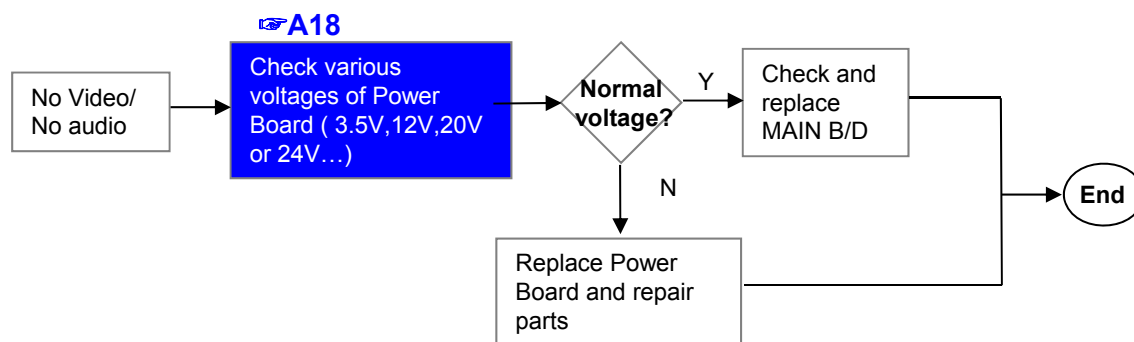
Established  
date

2013.01.31

No video/ No audio

Revised date

2/16

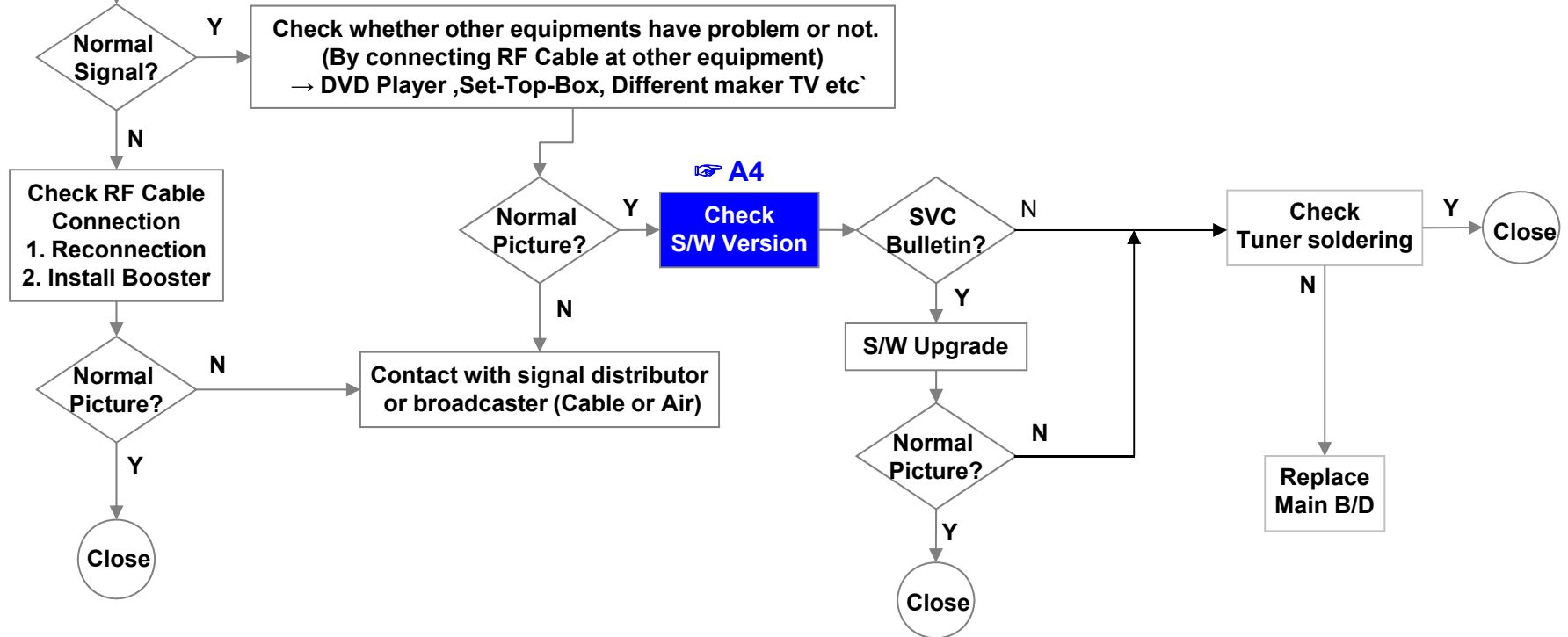


| LCD TV | Error symptom | A. Video error           | Established date | 2013.01.31 |      |
|--------|---------------|--------------------------|------------------|------------|------|
|        |               | Picture broken/ Freezing | Revised date     |            | 3/16 |

👉 A3

**Check RF Signal level**

- . By using Digital signal level meter
- . By using Diagnostics menu on OSD  
( Setting → Set up → Manual Tuning → Check the Signal )
- Signal strength (Normal : over 50%)
- Signal Quality (Normal: over 50%)





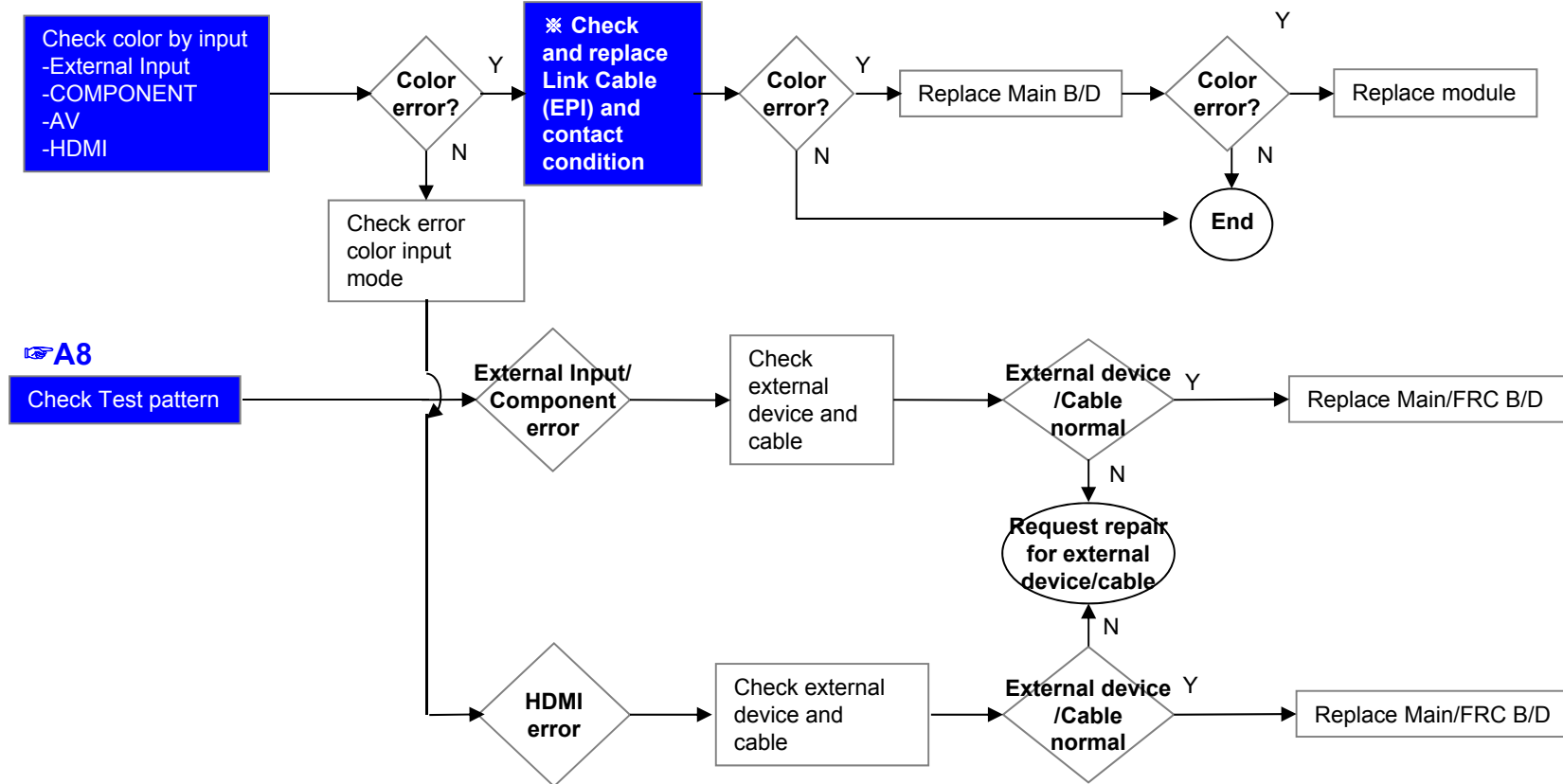
|        |               |                |                  |            |      |
|--------|---------------|----------------|------------------|------------|------|
| LCD TV | Error symptom | A. Video error | Established date | 2013.01.31 |      |
|        |               | Color error    | Revised date     |            | 4/16 |

## A6

Check color by input  
-External Input  
-COMPONENT  
-AV  
-HDMI

## A7

※ Check and replace Link Cable (EPI) and contact condition



|        |               |                                                                                    |                  |            |      |
|--------|---------------|------------------------------------------------------------------------------------|------------------|------------|------|
| LCD TV | Error symptom | <b>A. Video error</b>                                                              | Established date | 2013.01.31 |      |
|        |               | Vertical / Horizontal bar, residual image, light spot, external device color error | Revised date     |            | 5/16 |

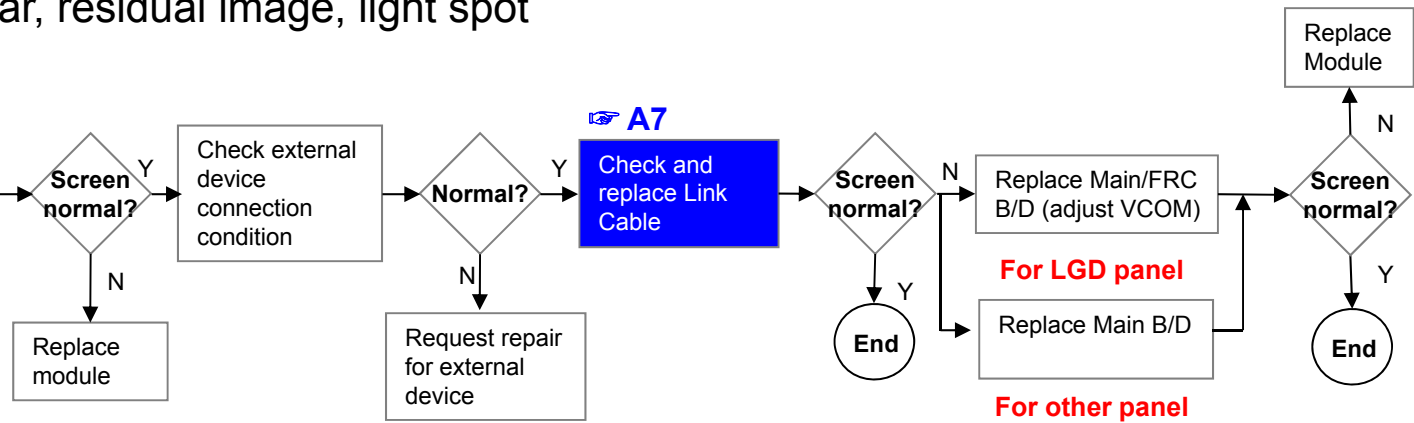
## Vertical/Horizontal bar, residual image, light spot

## A6

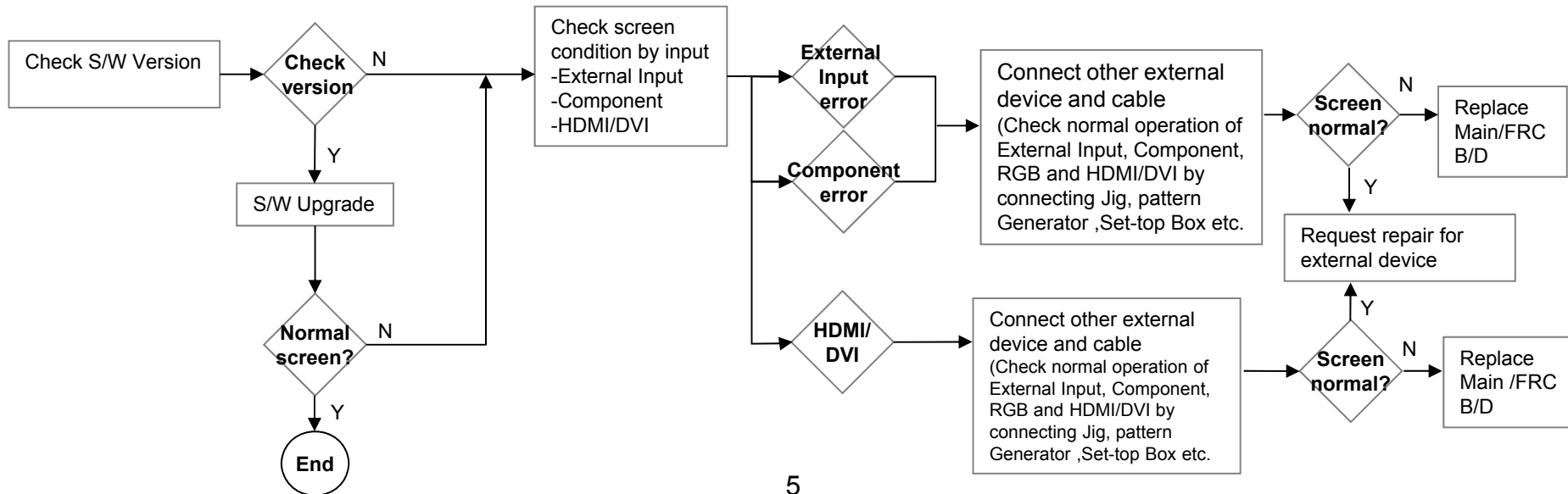
Check color condition by input  
-External Input  
-Component  
-HDMI

## A8

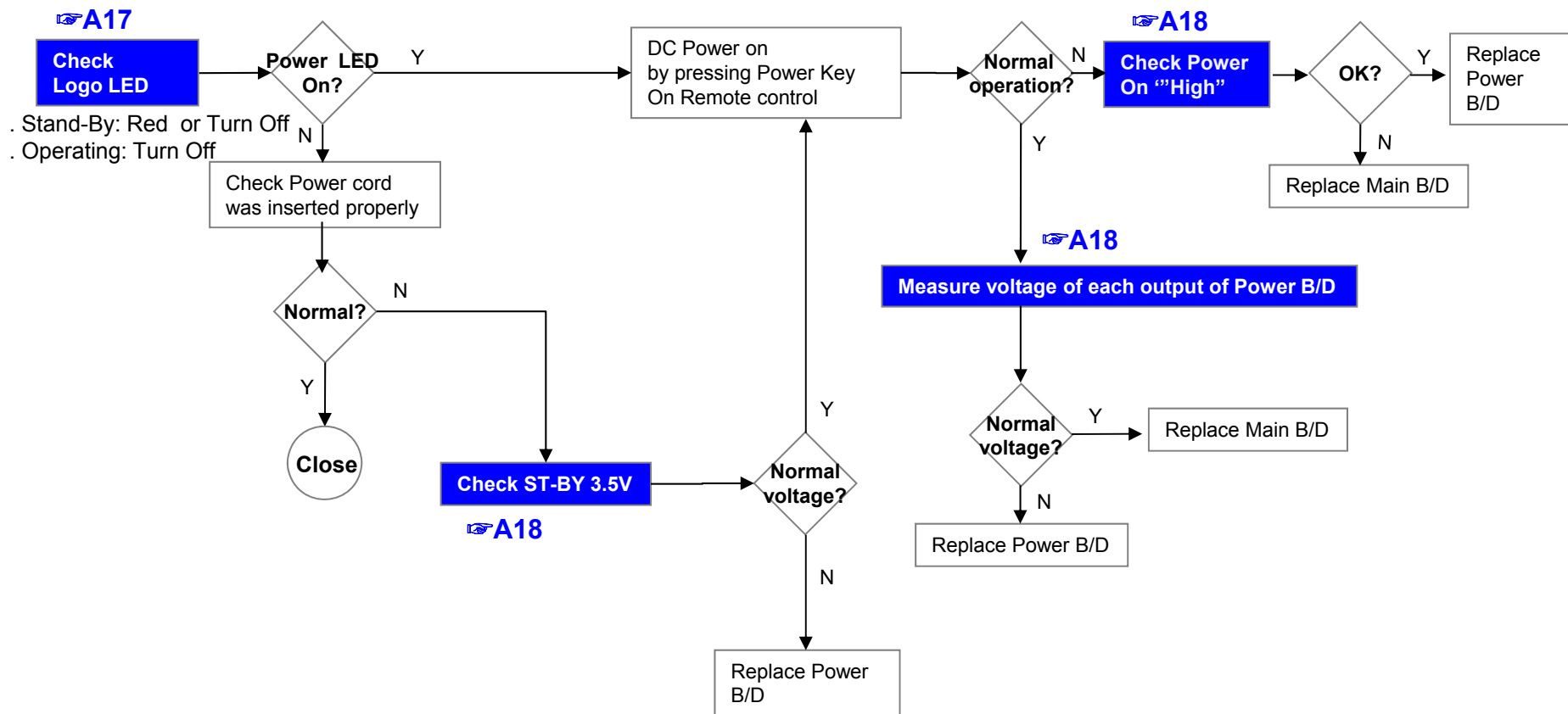
Check Test pattern



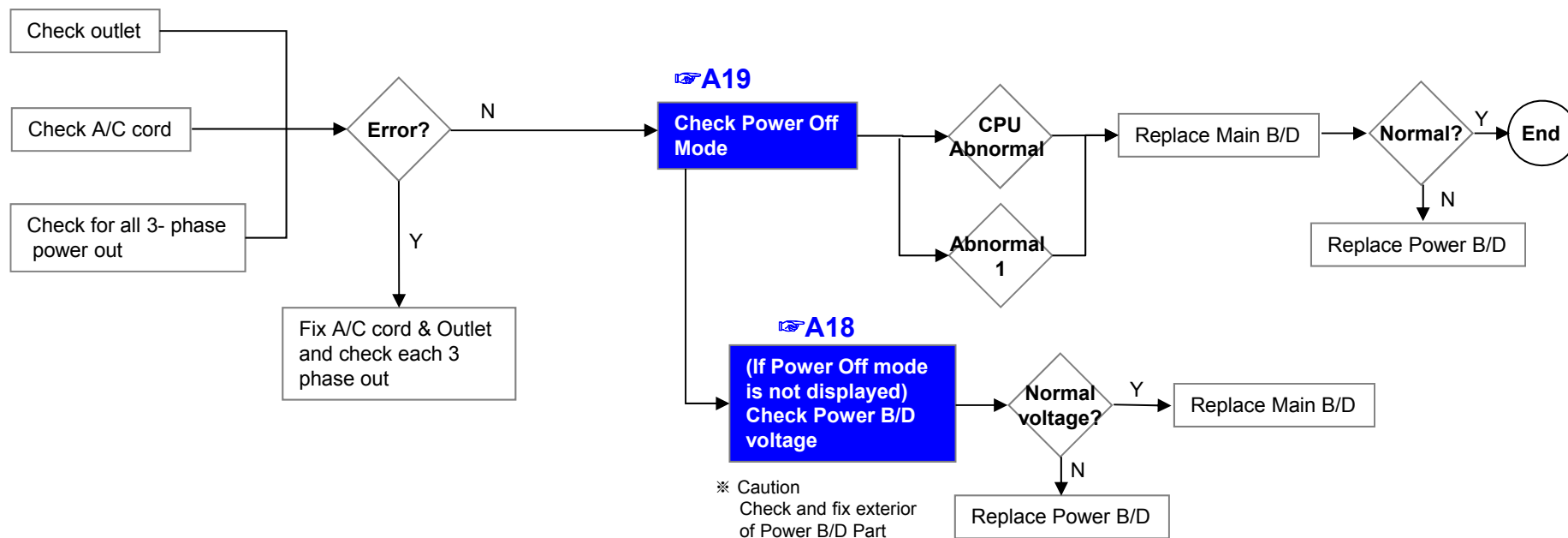
## External device screen error-Color error



| LCD TV | Error symptom | B. Power error | Established date | 2013.01.31 |      |
|--------|---------------|----------------|------------------|------------|------|
|        |               | No power       | Revised date     |            | 6/16 |



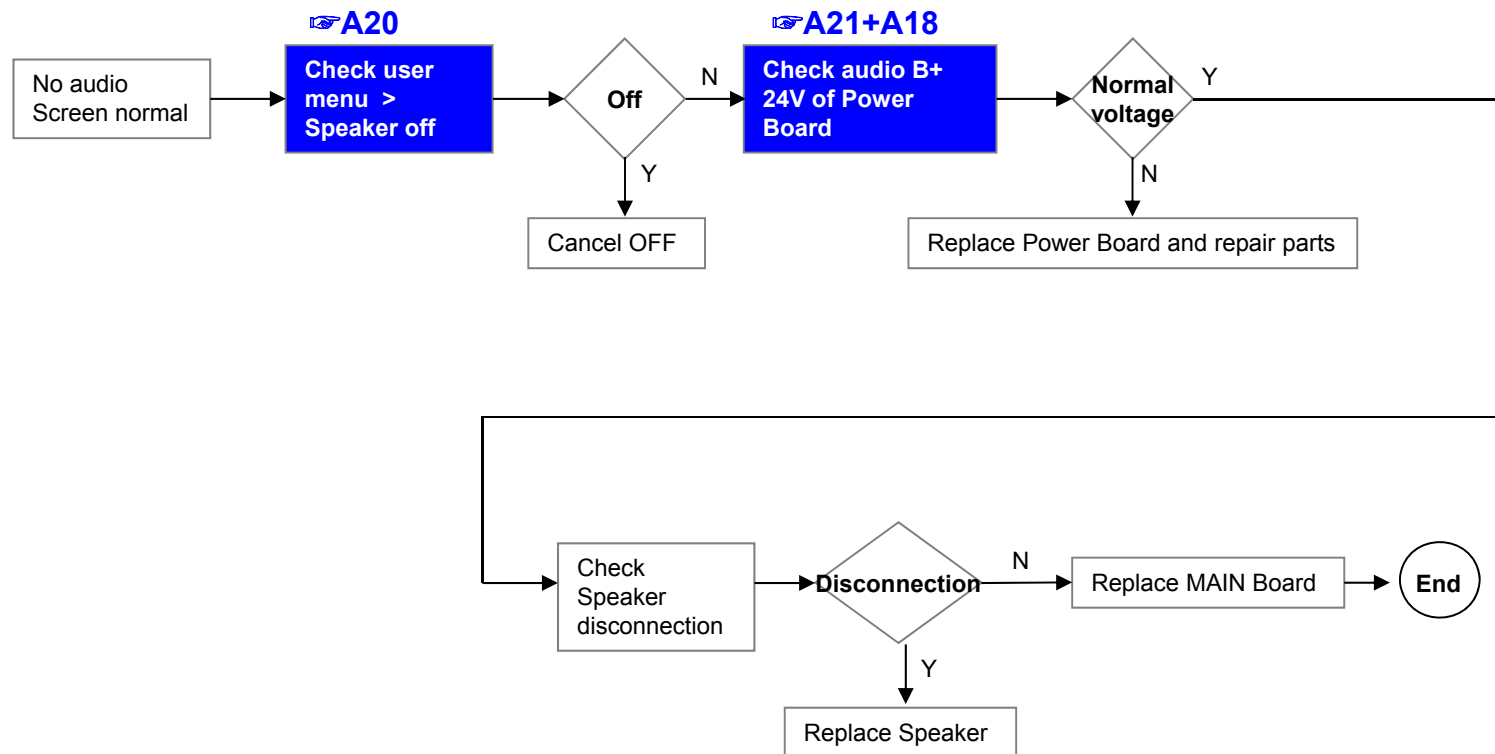
| LCD TV | Error symptom | B. Power error                                    | Established date | 2013.01.31 |      |
|--------|---------------|---------------------------------------------------|------------------|------------|------|
|        |               | Off when on, off while viewing, power auto on/off | Revised date     |            | 7/16 |



\* Please refer to the all cases which can be displayed on power off mode.

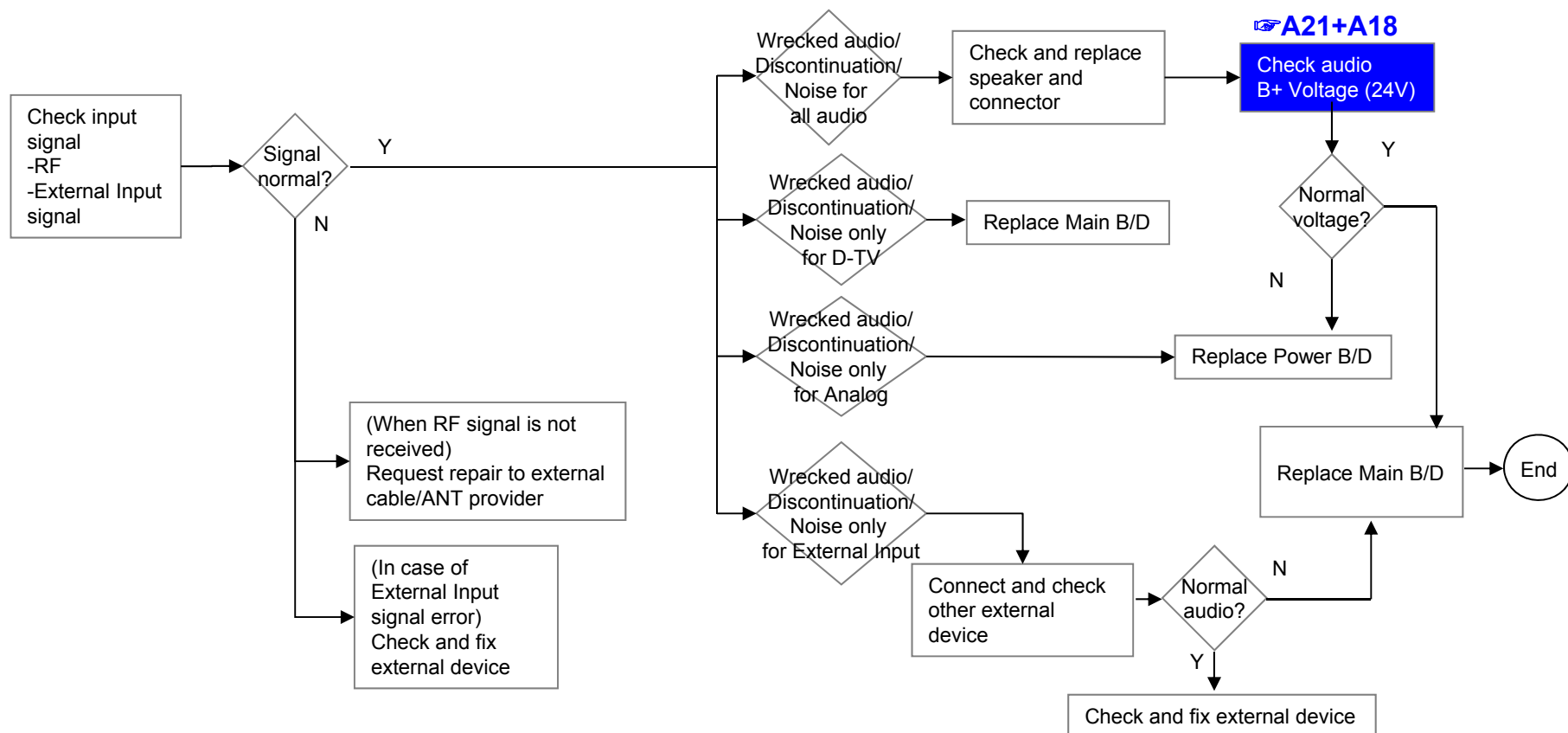
| Status   | Power off List         | Explanation                                     |
|----------|------------------------|-------------------------------------------------|
| Normal   | "POWEROFF_REMOTEKEY"   | Power off by REMOTE CONTROL                     |
|          | "POWEROFF_OFFTIMER"    | Power off by OFF TIMER                          |
|          | "POWEROFF_SLEEPTIMER"  | Power off by SLEEP TIMER                        |
|          | "POWEROFF_INSTOP"      | Power off by INSTOP KEY                         |
|          | "POWEROFF_AUTOOFF"     | Power off by AUTO OFF                           |
|          | "POWEROFF_ONTIMER"     | Power off by ON TIMER                           |
|          | "POWEROFF_RS232C"      | Power off by RS232C                             |
|          | "POWEROFF_RESREC"      | Power off by Reserved Record                    |
|          | "POWEROFF_RECEND"      | Power off by End of Recording                   |
|          | "POWEROFF_SWDOWN"      | Power off by S/W Download                       |
|          | "POWEROFF_UNKNOWN"     | Power off by unknown status except listed case  |
| Abnormal | "POWEROFF_ABNORMAL1"   | Power off by abnormal status except CPU trouble |
|          | "POWEROFF_CPUABNORMAL" | Power off by CPU Abnormal                       |

|        |               |                        |                  |            |      |
|--------|---------------|------------------------|------------------|------------|------|
| LCD TV | Error symptom | C. Audio error         | Established date | 2013.01.31 |      |
|        |               | No audio/ Normal video | Revised date     |            | 8/16 |



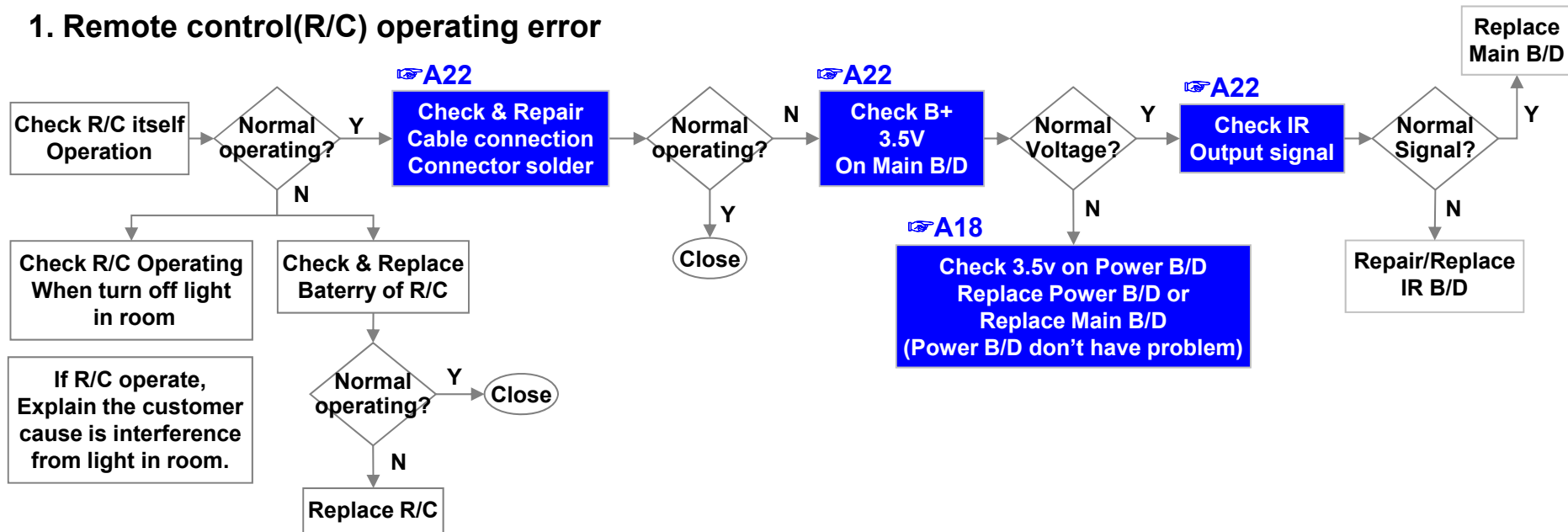
| LCD TV | Error symptom | C. Audio error                       | Established date | 2013.01.31 |      |
|--------|---------------|--------------------------------------|------------------|------------|------|
|        |               | Wrecked audio/ discontinuation/noise | Revised date     |            | 9/16 |

→ abnormal audio/discontinuation/noise is same after “Check input signal” compared to No audio



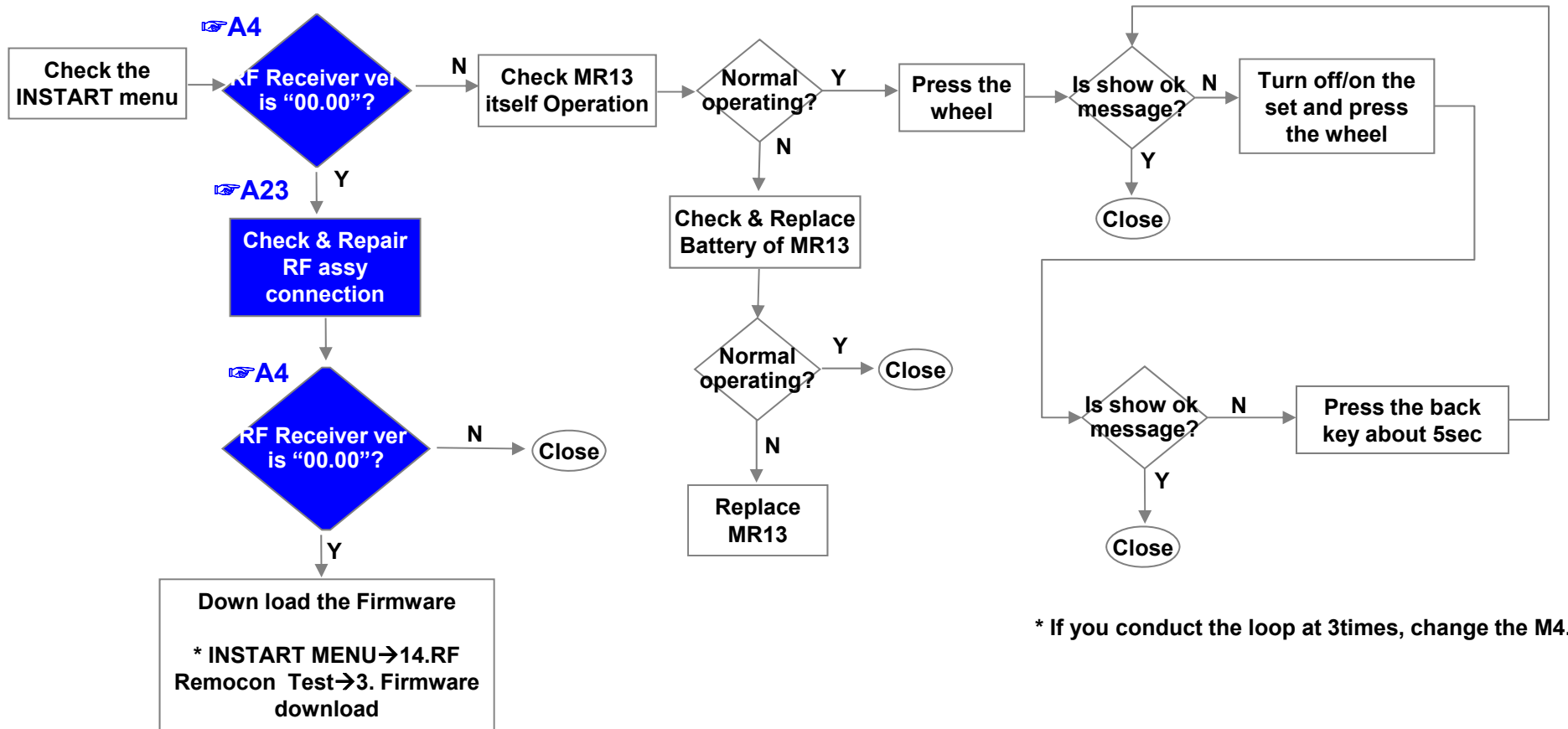
|        |               |                                        |                  |            |       |
|--------|---------------|----------------------------------------|------------------|------------|-------|
| LCD TV | Error symptom | D. Function error                      | Established date | 2013.01.31 |       |
|        |               | Remote control & Local switch checking | Revised date     |            | 10/16 |

## 1. Remote control(R/C) operating error



| LCD TV | Error symptom | D. Function error       | Established date | 2013.01.31 |       |
|--------|---------------|-------------------------|------------------|------------|-------|
|        |               | MR13 operating checking | Revised date     |            | 11/16 |

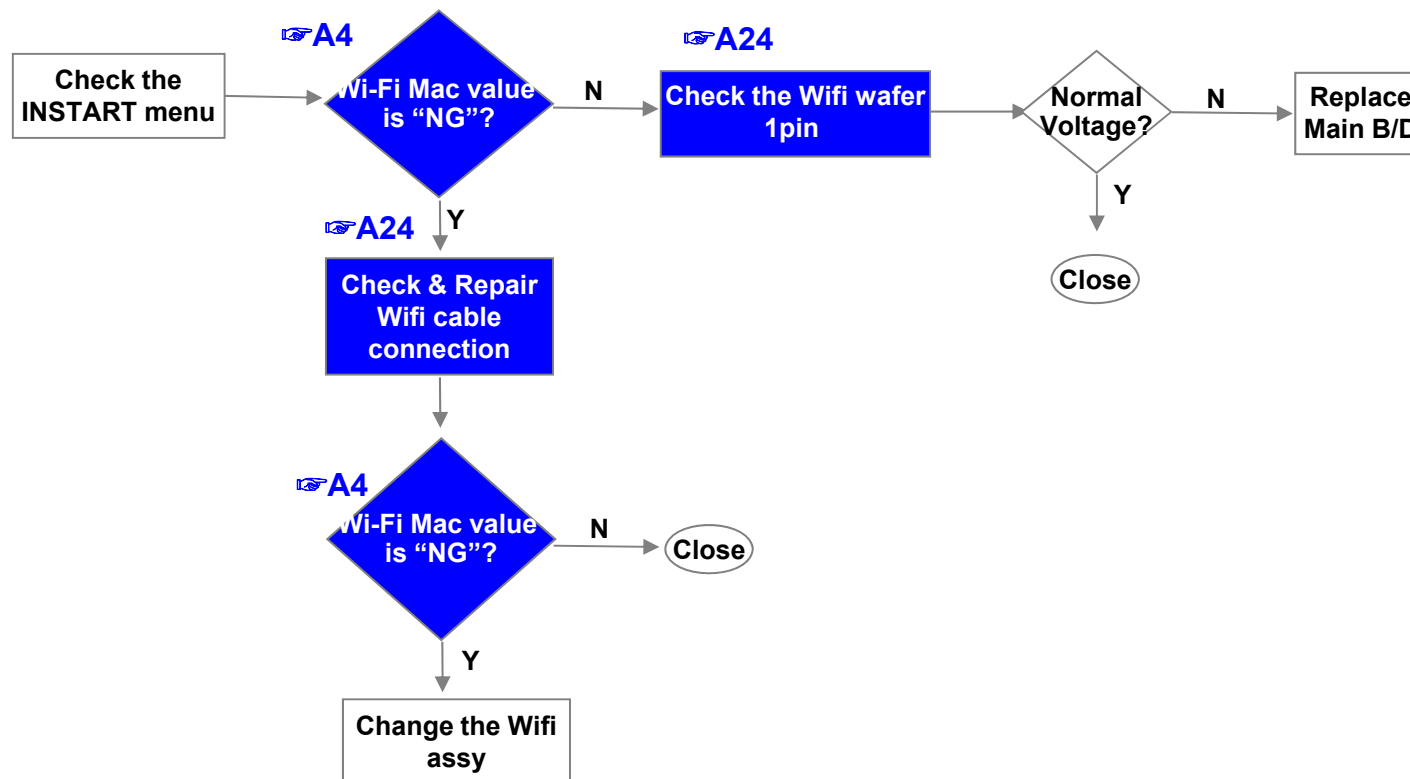
## 2. MR13(Magic Remocon) operating error



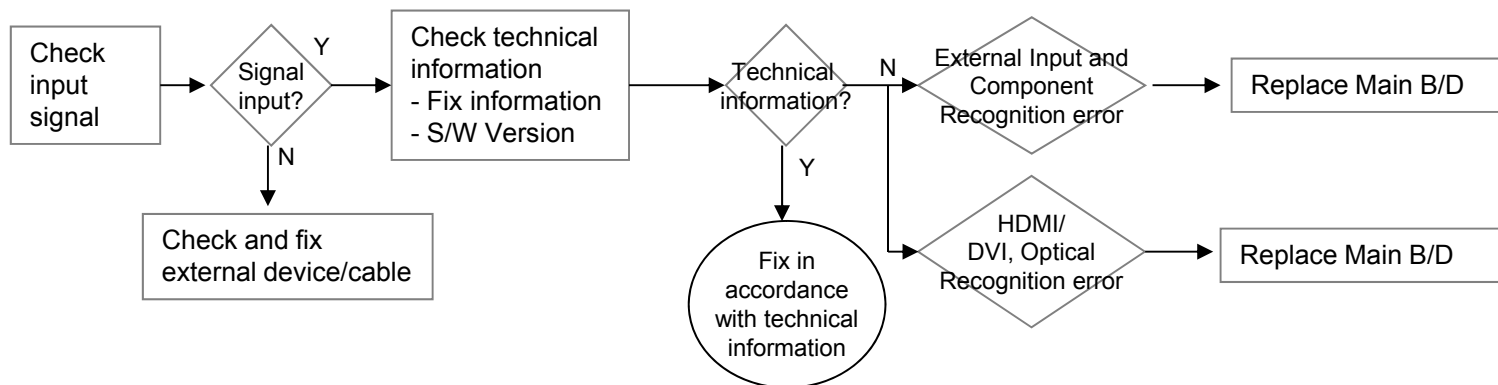


| LCD TV | Error symptom | D. Function error       | Established date | 2013.01.31 |       |
|--------|---------------|-------------------------|------------------|------------|-------|
|        |               | Wifi operating checking | Revised date     |            | 12/16 |

### 3.Wifi operating error



| LCD TV | Error symptom | D. Function error                 | Established date | 2013.01.31 |       |
|--------|---------------|-----------------------------------|------------------|------------|-------|
|        |               | External device recognition error | Revised date     |            | 14/16 |



LCD TV

Error  
symptom

E. Noise

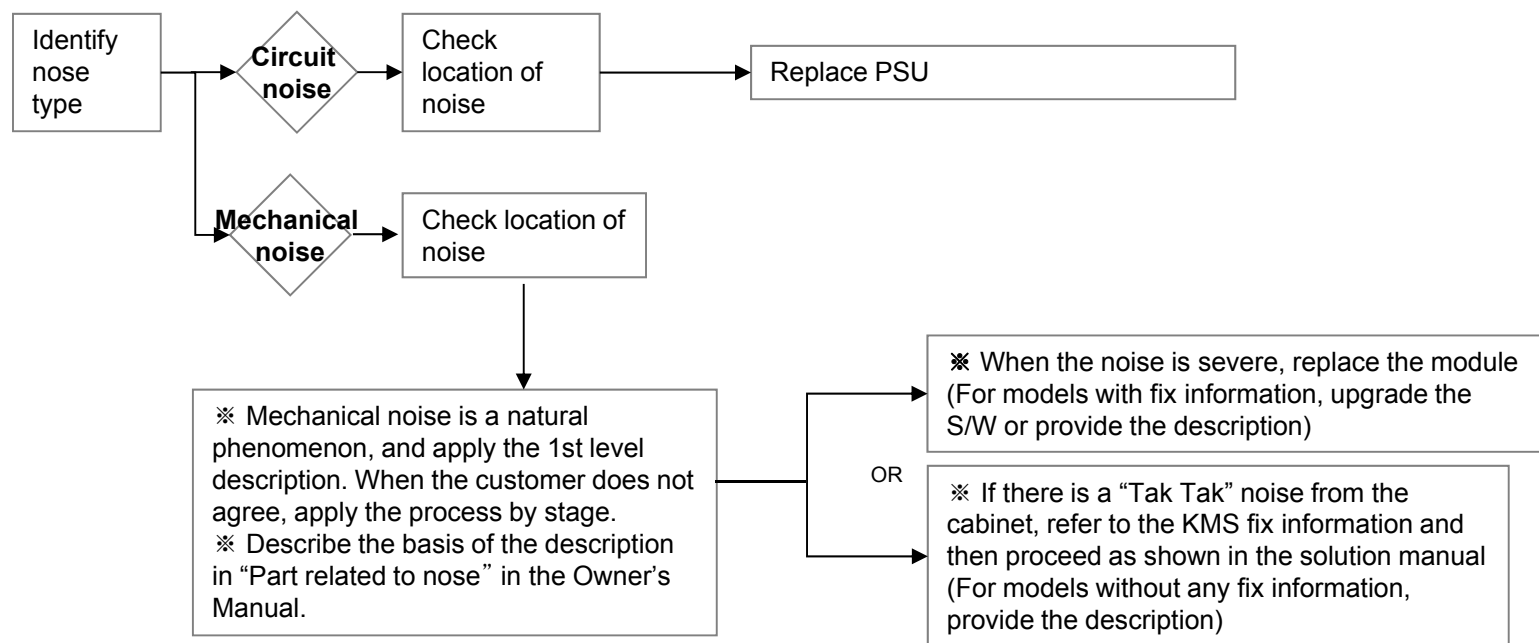
Established  
date

2013.01.31

Circuit noise, mechanical noise

Revised date

15/16



LCD TV

Error  
symptom

## F. Exterior defect

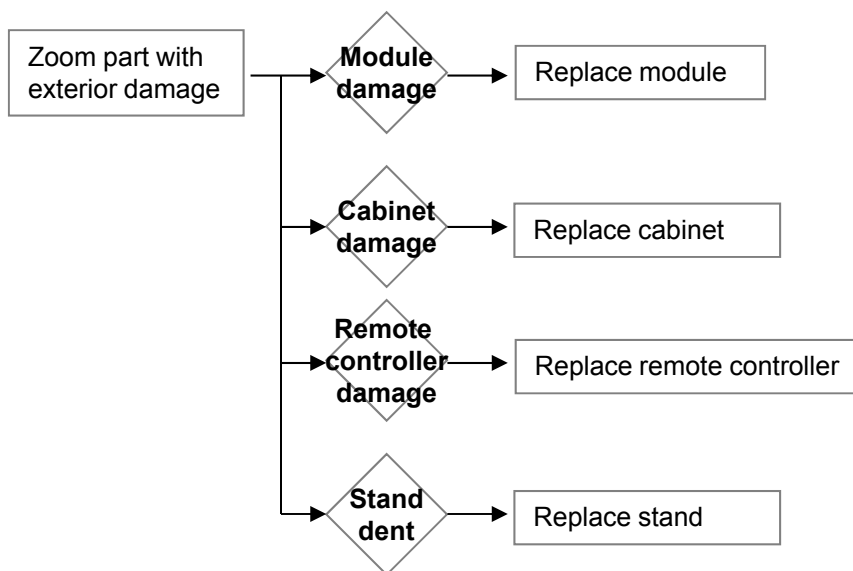
Established  
date

2013.01.31

Exterior defect

Revised date

16/16



# Contents of LCD TV Standard Repair Process Detail Technical Manual

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# Contents of LCD TV Standard Repair Process Detail Technical Manual

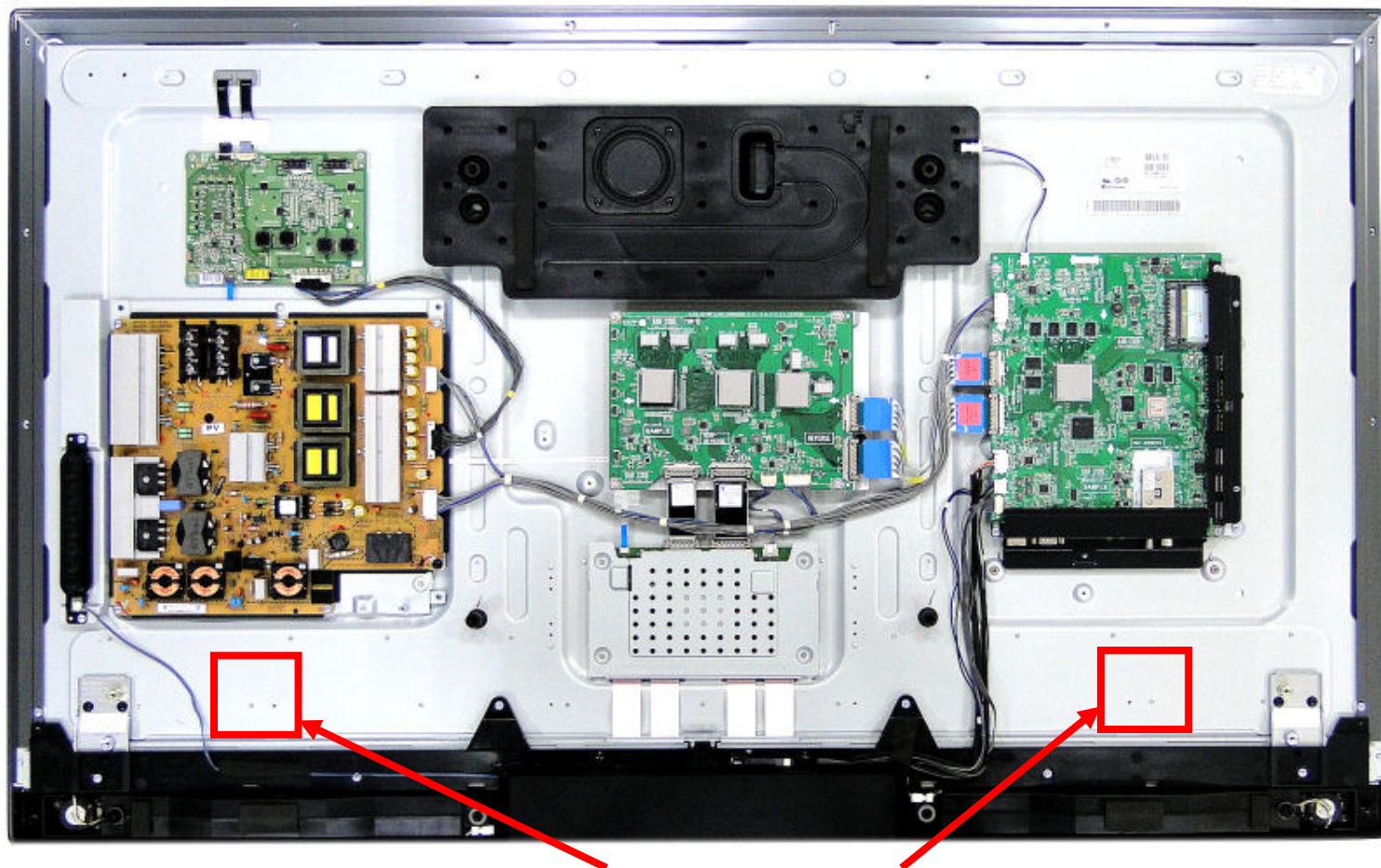
Continued from previous page

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# Standard Repair Process Detail Technical Manual

|        |               |                                      |                  |            |    |
|--------|---------------|--------------------------------------|------------------|------------|----|
| LCD TV | Error symptom | A. Video error_No video/Normal audio | Established date | 2013.01.31 |    |
|        | Content       | Check LCD back light with naked eye  | Revised date     |            | A1 |

<XXLA965V-ZA>



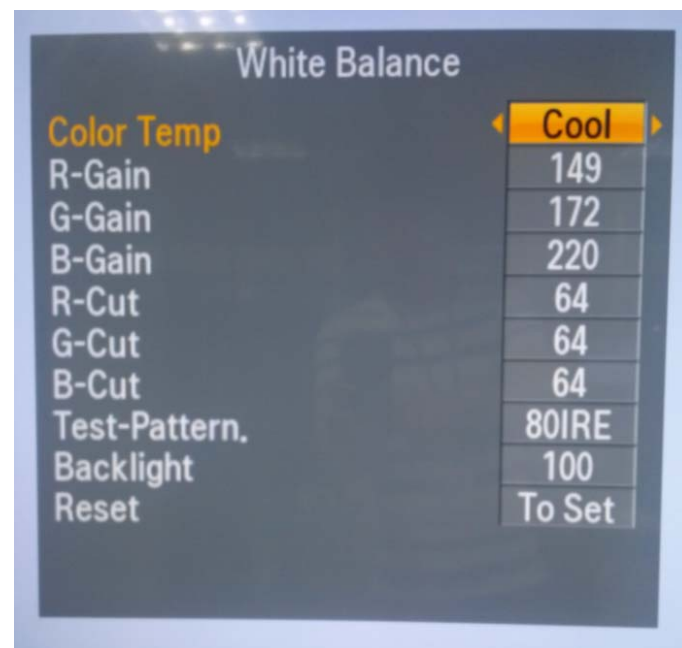
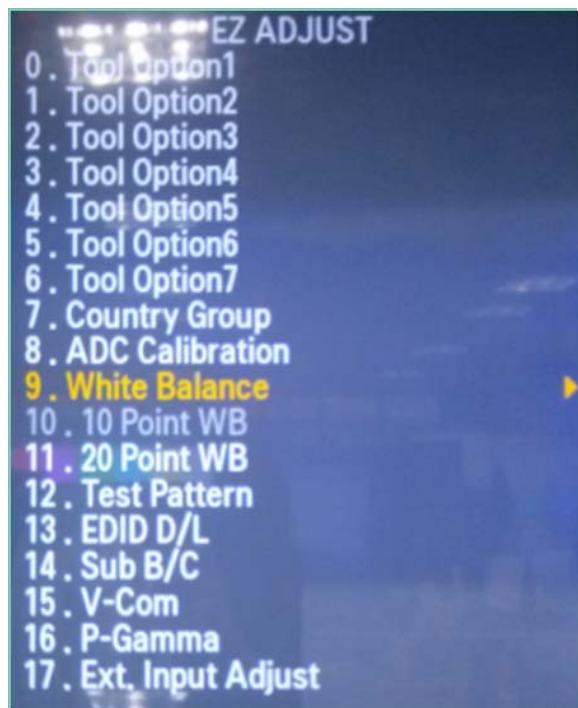
After turning on the power and disassembling the case, check with the naked eye, whether you can see light from 2 locations.

A1

# Standard Repair Process Detail Technical Manual

|        |               |                                      |                  |            |    |
|--------|---------------|--------------------------------------|------------------|------------|----|
| LCD TV | Error symptom | A. Video error_No video/Normal audio | Established date | 2013.01.31 |    |
|        | Content       | Check White Balance value            | Revised date     |            | A2 |

<ALL MODELS>



## Entry method

1. Press the ADJ button on the remote controller for adjustment.
2. Enter into White Balance of item 9.
3. After recording the R, G, B (GAIN, Cut) value of Color Temp (Cool/Medium/Warm), re-enter the value after replacing the MAIN BOARD.

A2



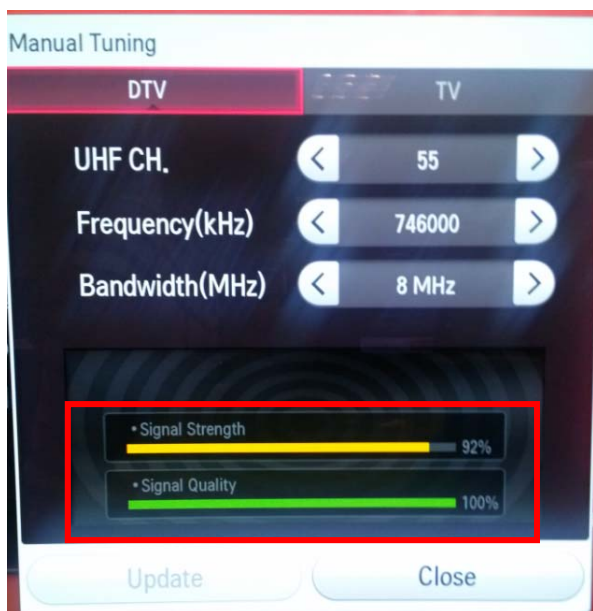
# Standard Repair Process Detail Technical Manual

|        |               |                                             |                  |            |    |
|--------|---------------|---------------------------------------------|------------------|------------|----|
| LCD TV | Error symptom | A. Video error_Video error, video lag/stop  | Established date | 2013.01.31 | A3 |
|        | Content       | TUNER input signal strength checking method | Revised date     |            |    |

<ALL MODELS>



Settings → Set up → Manual Tuning  
→ select channel



When the signal is strong, use the attenuator (-10dB, -15dB, -20dB etc.)



A3

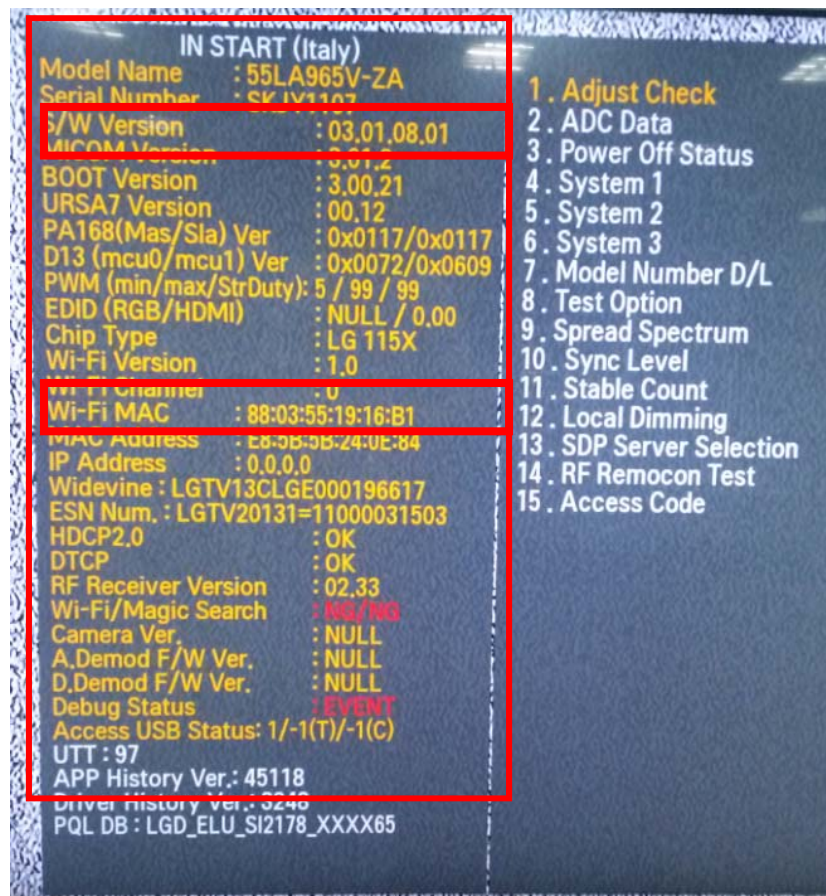
# Standard Repair Process Detail Technical Manual

|        |               |                                            |                  |            |    |
|--------|---------------|--------------------------------------------|------------------|------------|----|
| LCD TV | Error symptom | A. Video error_Video error, video lag/stop | Established date | 2013.01.31 |    |
|        | Content       | LCD-TV Version checking method             | Revised date     |            | A4 |

<ALL MODELS>

## 1. Checking method for remote controller for adjustment

Version



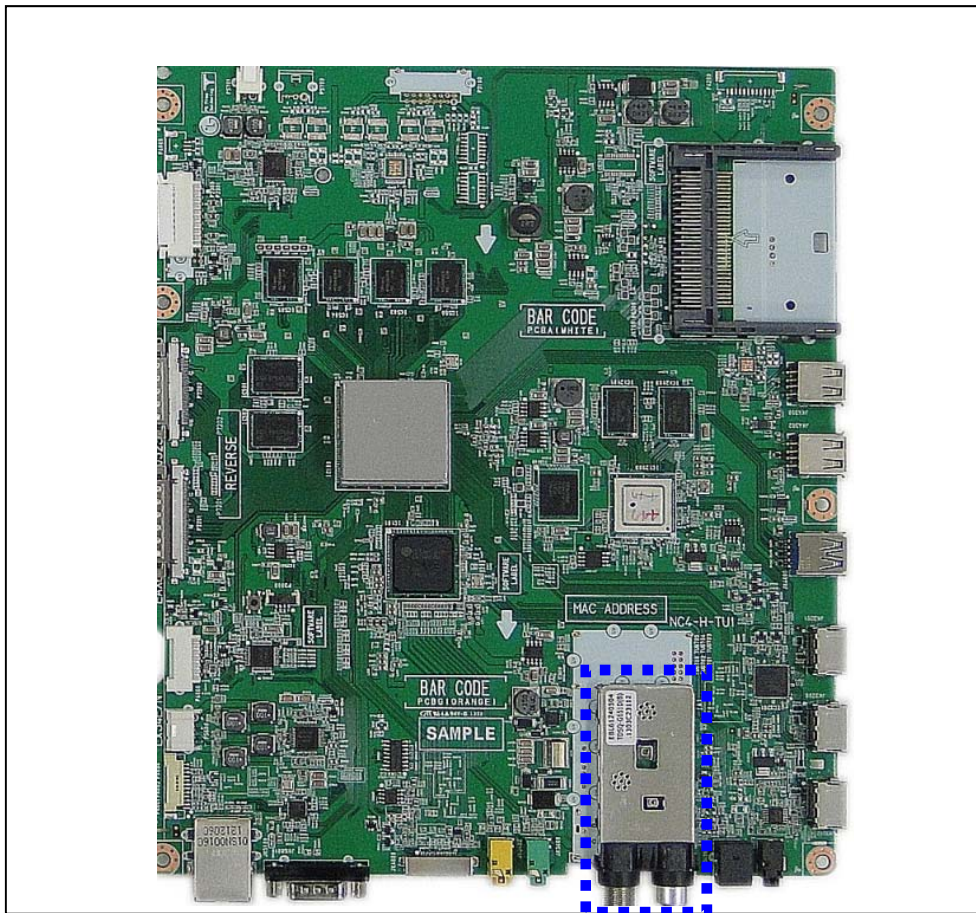
Press the IN-START with the remote controller for adjustment

A4

# Standard Repair Process Detail Technical Manual

|        |               |                                            |                  |            |    |
|--------|---------------|--------------------------------------------|------------------|------------|----|
| LCD TV | Error symptom | A. Video error_Video error, video lag/stop | Established date | 2013.01.31 |    |
|        | Content       | TUNER checking part                        | Revised date     |            | A5 |

<ALL MODELS>



Checking method:

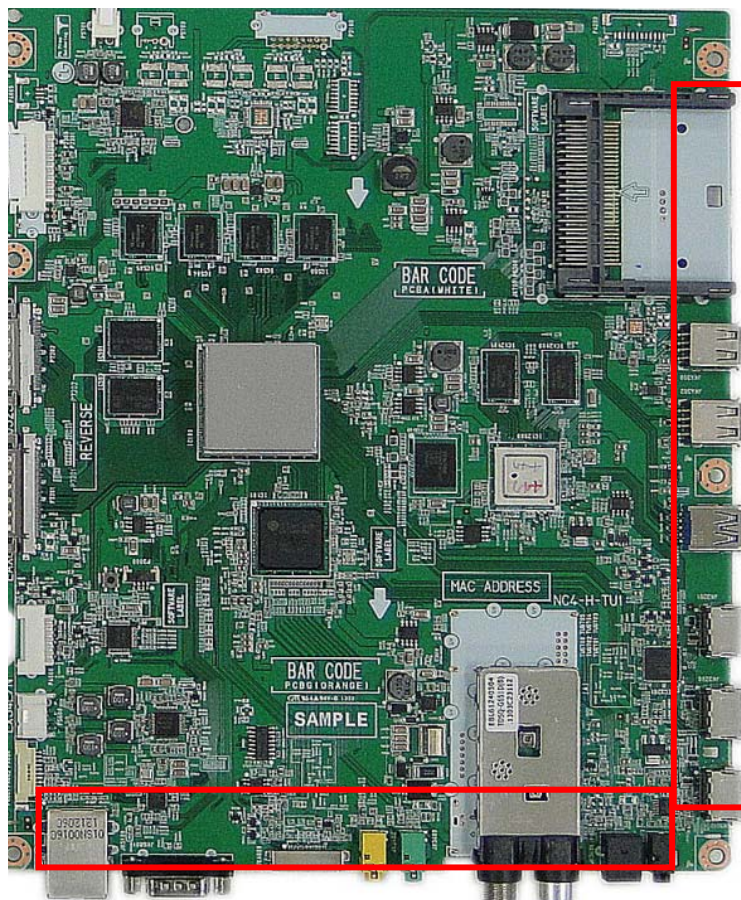
1. Check the signal strength or check whether the screen is normal when the external device is connected.
2. After measuring each voltage from power supply, finally replace the MAIN BOARD.



# Standard Repair Process Detail Technical Manual

|        |               |                                                                     |                  |            |    |
|--------|---------------|---------------------------------------------------------------------|------------------|------------|----|
| LCD TV | Error symptom | A. Video error _Vertical/Horizontal bar, residual image, light spot | Established date | 2013.01.31 |    |
|        | Content       | LCD TV connection diagram (1)                                       | Revised date     |            | A6 |

<ALL MODELS>



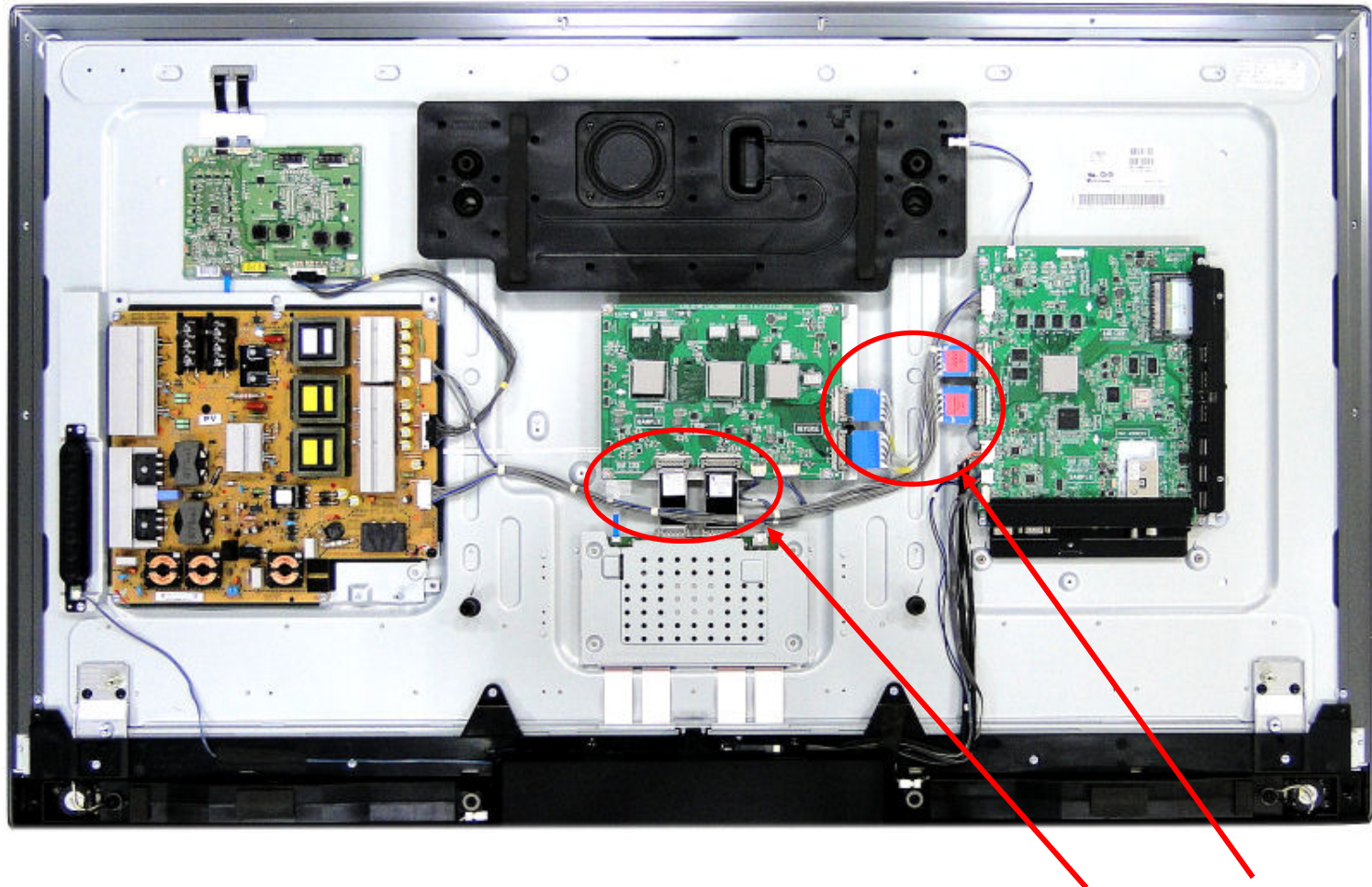
As the part connecting to the external input, check the screen condition by signal

A6

# Standard Repair Process Detail Technical Manual

|        |               |                                                |                  |            |    |
|--------|---------------|------------------------------------------------|------------------|------------|----|
| LCD TV | Error symptom | A. Video error_Color error                     | Established date | 2013.01.31 |    |
|        | Content       | Check Link Cable (LVDS) reconnection condition | Revised date     |            | A7 |

<ALL MODELS>



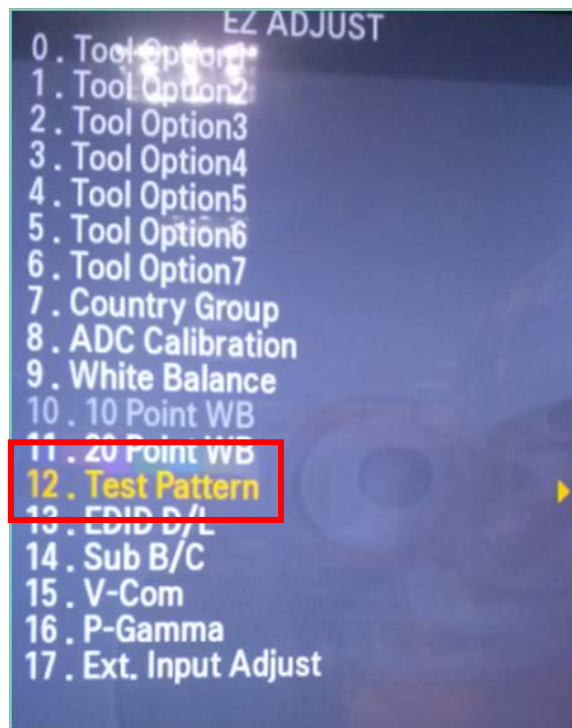
Check the contact condition of the Link Cable, especially dust or mis insertion.

A7



# Standard Repair Process Detail Technical Manual

|        |               |                                   |                  |            |    |
|--------|---------------|-----------------------------------|------------------|------------|----|
| LCD TV | Error symptom | A. Video error_Color error        | Established date | 2013.01.31 |    |
|        | Content       | Adjustment Test pattern - ADJ Key | Revised date     |            | A8 |



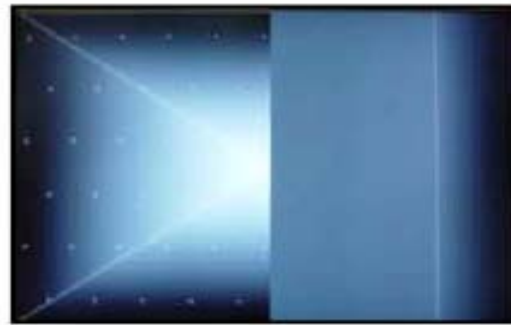
You can view 6 types of patterns using the ADJ Key

Checking item : 1. Defective pixel    2. Residual image    3. MODULE error (ADD-BAR,SCAN BAR..)  
4.Video error (Classification of MODULE or Main-B/D!)

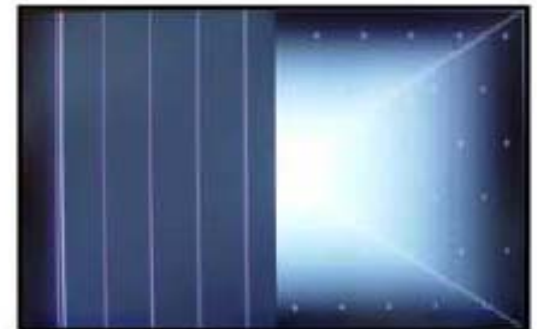
## Appendix : Exchange Main Board (1)



Solder defect, CNT Broken



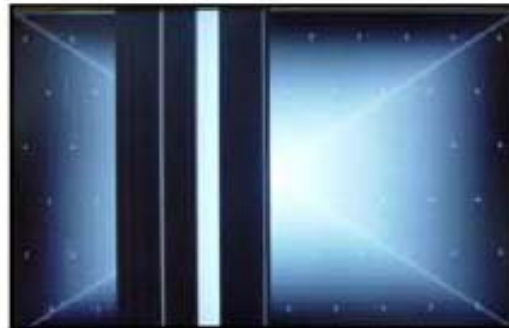
Solder defect, CNT Broken



Solder defect, CNT Broken



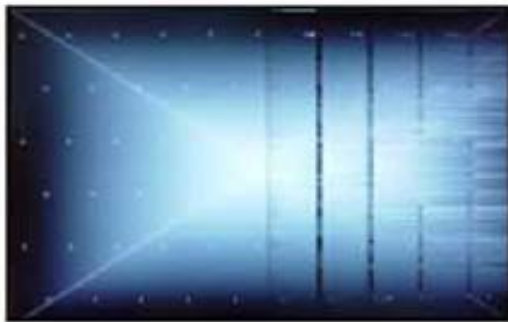
Solder defect, CNT Broken



Solder defect, CNT Broken



Abnormal Power Section



Solder defect, Short/Crack

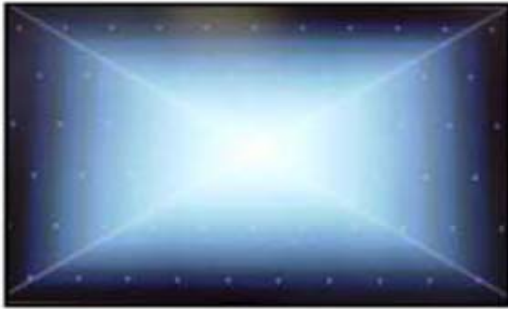


Abnormal Power Section



Solder defect, Short/Crack

## Appendix : Exchange Main Board (2)



Abnormal Power Section



Abnormal Power Section



Solder defect, Short/Crack



Solder defect, Short/Crack



Fuse Open, Abnormal power section



Abnormal Display



GRADATION



Noise



GRADATION



## Appendix : Exchange Power Board (PSU)



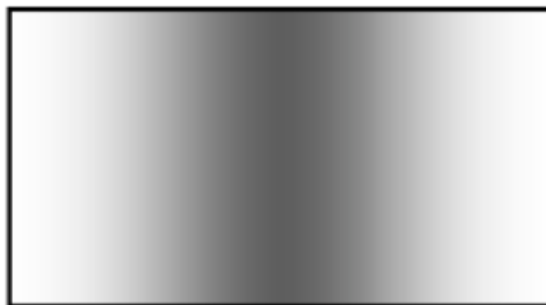
No Light



Dim Light



Dim Light



Dim Light



No picture/Sound Ok

## Appendix : Exchange the Module (1)



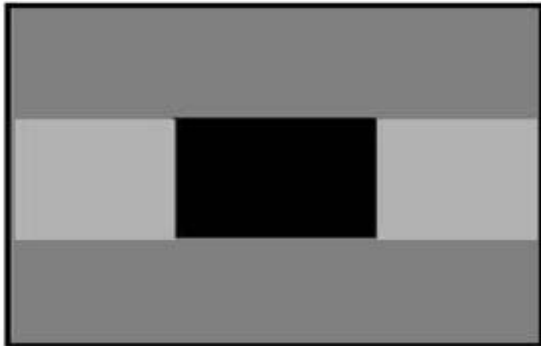
Panel Mura, Light leakage



Panel Mura, Light leakage



Press damage



Crosstalk



Press damage



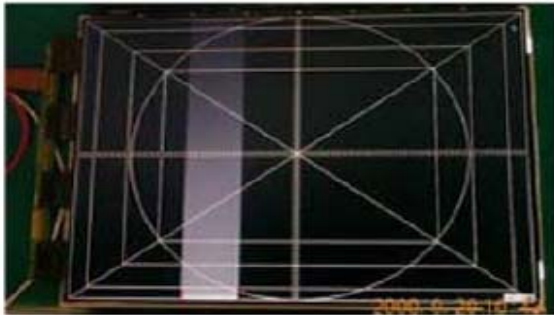
Crosstalk

**Un-repairable Cases**  
**In this case please exchange the module.**



Press damage

## Appendix : Exchange the Module (2)



Vertical Block  
Source TAB IC Defect



Vertical Line  
Source TAB IC Defect



Vertical Block  
Source TAB IC Defect



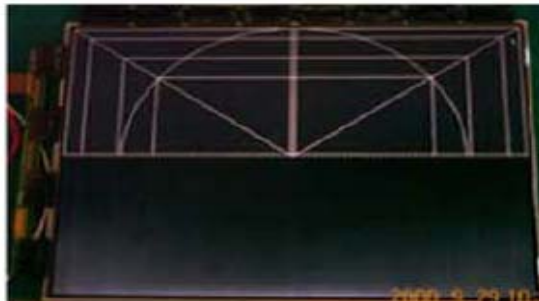
Horizontal Block  
Gate TAB IC Defect



Horizontal Block  
Gate TAB IC Defect



Horizontal line  
Gate TAB IC Defect



Horizontal Block  
Gate TAB IC Defect

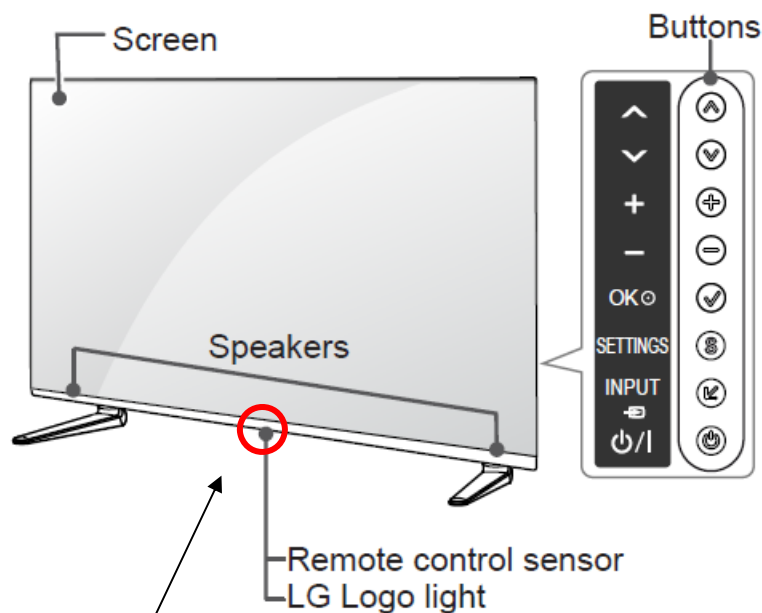
### Un-repairable Cases

**In this case please exchange the module.**

# Standard Repair Process Detail Technical Manual

|        |               |                             |                  |            |     |
|--------|---------------|-----------------------------|------------------|------------|-----|
| LCD TV | Error symptom | B. Power error _No power    | Established date | 2013.01.31 |     |
|        | Content       | Check front Power Indicator | Revised date     |            | A17 |

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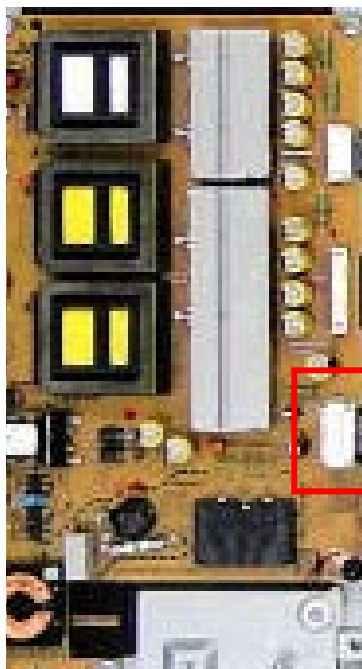


| Button | Description                                                      |
|--------|------------------------------------------------------------------|
| ^ v    | Scrolls through the saved programmes.                            |
| + -    | Adjusts the volume level.                                        |
| ✓      | Selects the highlighted menu option or confirms an input.        |
| S      | Accesses the main menu, or saves your input and exits the menus. |
| ↵      | Changes the input source.                                        |
| ⏻      | Turns the power on or off.                                       |

ST-BY condition: On or Off  
Power ON condition: Turn Off

# Standard Repair Process Detail Technical Manual

|        |               |                                          |                  |            |     |
|--------|---------------|------------------------------------------|------------------|------------|-----|
| LCD TV | Error symptom | B. Power error _No power                 | Established date | 2013.01.31 | A18 |
|        | Content       | Check power input voltage and ST-BY 3.5V | Revised date     |            |     |



Check the DC 24V, 12V, 3.5V.

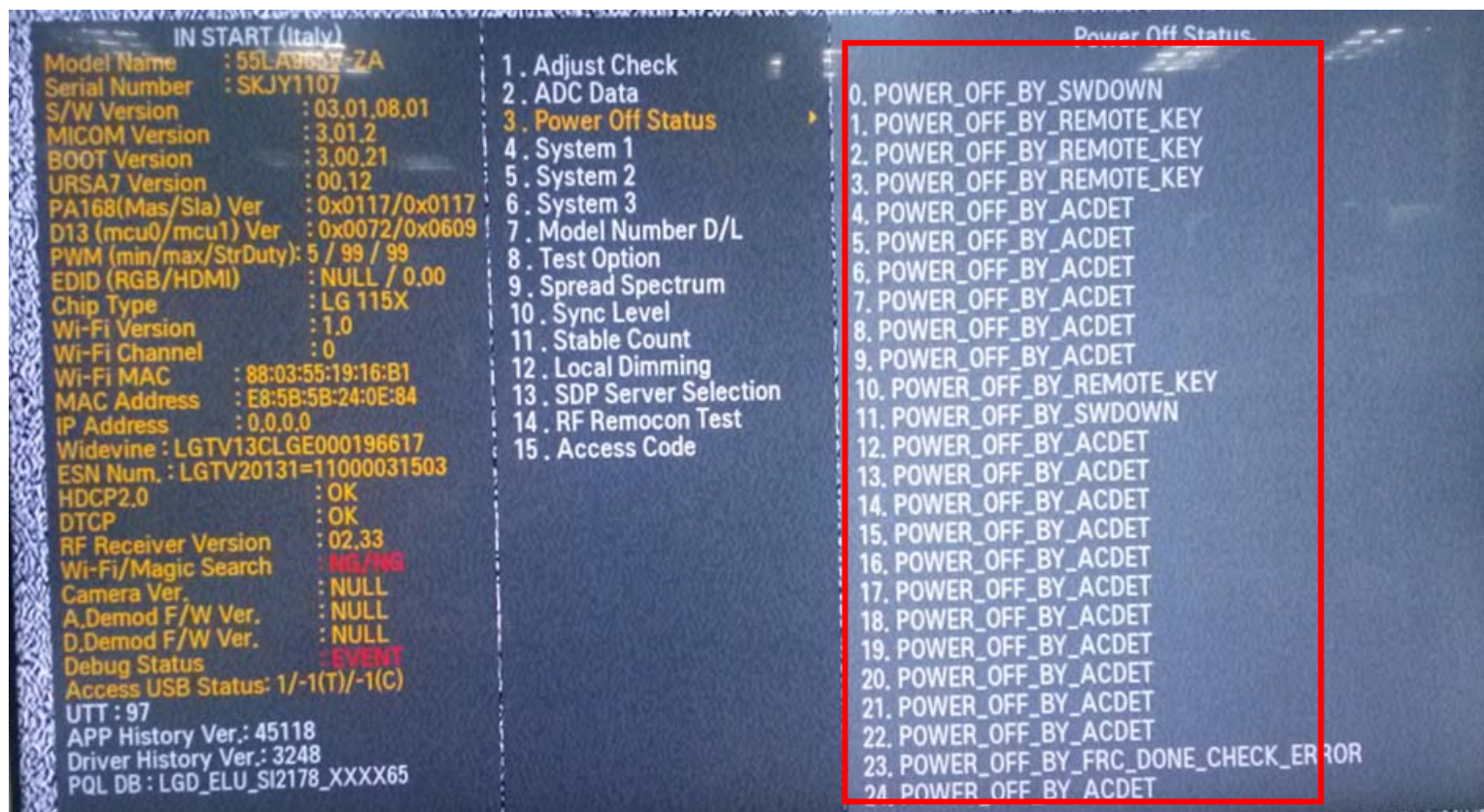
| 18 Pin (Power Board ↔ Main Board) |          |    |        |
|-----------------------------------|----------|----|--------|
| 1                                 | Power on | 2  | INV ON |
| 3                                 | 3.5V     | 4  | PDIM#1 |
| 5                                 | 3.5V     | 6  | PDIM#2 |
| 7                                 | GND      | 8  | GND    |
| 9                                 | 24V      | 10 | 24V    |
| 11                                | GND      | 12 | GND    |
| 13                                | 12V      | 14 | 12V    |
| 15                                | 12V      | 16 | 24V    |
| 17                                | GND      | 18 | GND    |



# Standard Repair Process Detail Technical Manual

|        |               |                                                  |                  |            |     |
|--------|---------------|--------------------------------------------------|------------------|------------|-----|
| LCD TV | Error symptom | B. Power error _Off when on, off whiling viewing | Established date | 2013.01.31 |     |
|        | Content       | POWER OFF MODE checking method                   | Revised date     |            | A19 |

<ALL MODELS>



Entry method

1. Press the IN-START button of the remote controller for adjustment
2. Check the entry into adjustment item 3

A19

# Standard Repair Process Detail Technical Manual

|        |               |                                                |                  |            |     |
|--------|---------------|------------------------------------------------|------------------|------------|-----|
| LCD TV | Error symptom | C. Audio error_No audio/Normal video           | Established date | 2013.01.31 |     |
|        | Content       | Checking method in menu when there is no audio | Revised date     |            | A20 |

<ALL MODELS>



## Checking method

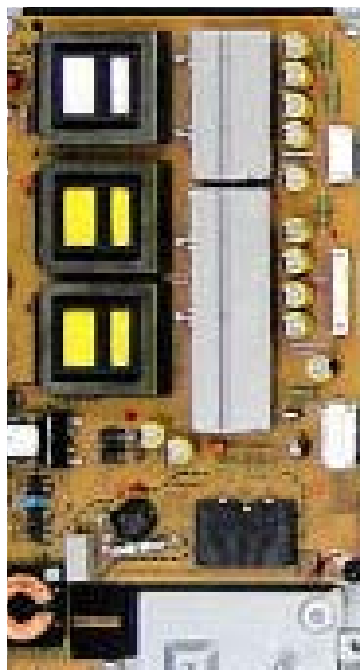
1. Press the Setting button on the remote controller
2. Select the Sound function of the Menu
3. Select the Sound Setting
4. Select TV Speaker

A20

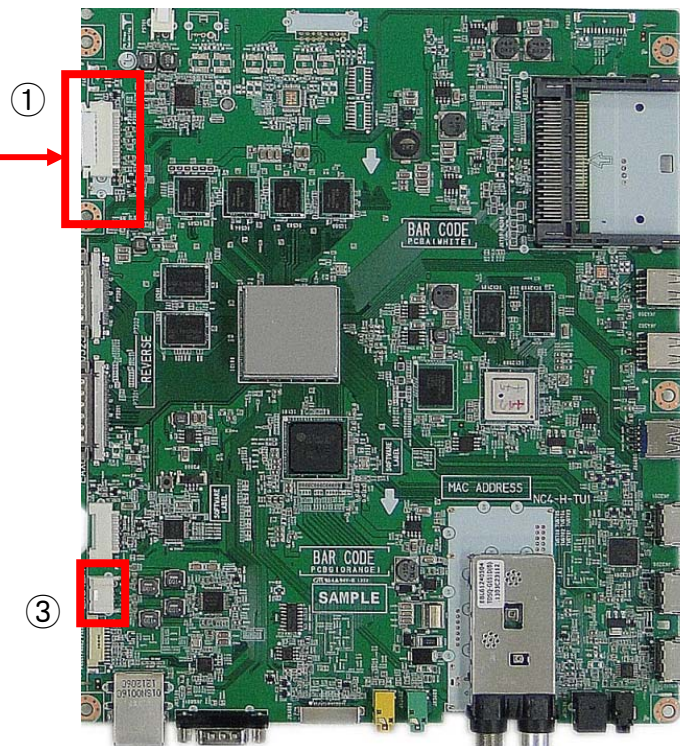
# Standard Repair Process Detail Technical Manual

|        |               |                                                            |                  |            |     |
|--------|---------------|------------------------------------------------------------|------------------|------------|-----|
| LCD TV | Error symptom | C. Audio error_No audio/Normal video                       | Established date | 2013.01.31 |     |
|        | Content       | Voltage and speaker checking method when there is no audio | Revised date     |            | A21 |

<XXLA965V-ZA>



| 24 Pin (Power Board ↔ Main Board) |          |    |        |
|-----------------------------------|----------|----|--------|
| 1                                 | Power on | 2  | INV ON |
| 3                                 | 3.5V     | 4  | PDIM#1 |
| 5                                 | 3.5V     | 6  | PDIM#2 |
| 7                                 | GND      | 8  | GND    |
| 9                                 | 24V      | 10 | 24V    |
| 11                                | GND      | 12 | GND    |
| 13                                | 12V      | 14 | 12V    |
| 15                                | 12V      | 16 | 24V    |
| 17                                | GND      | 18 | GND    |



## Checking order when there is no audio

- ① Check the contact condition of or 24V connector of Main Board
- ② Measure the 24V input voltage supplied from Power Board  
(If there is no input voltage, remove and check the connector)
- ③ Connect the tester RX1 to the speaker terminal and if you hear the Chik Chik sound when you touch the GND and output terminal, the speaker is normal.

A21



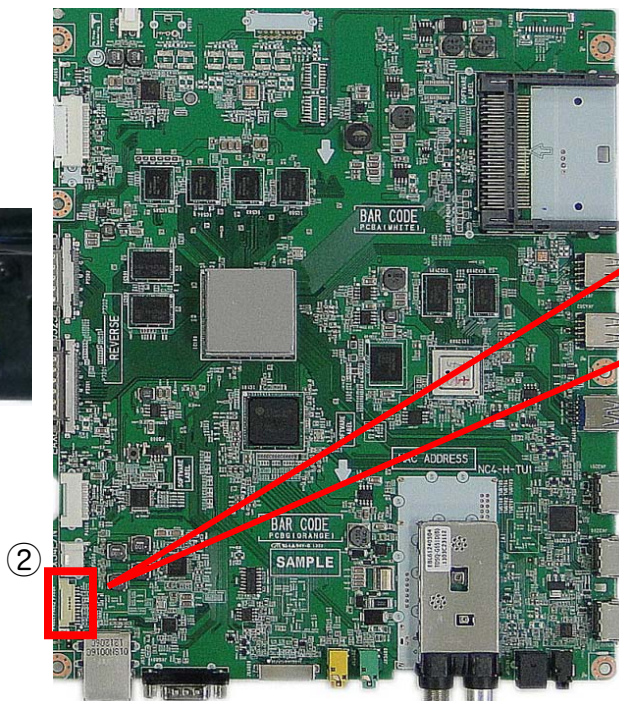
# Standard Repair Process Detail Technical Manual

|        |               |                                             |                  |            |     |
|--------|---------------|---------------------------------------------|------------------|------------|-----|
| LCD TV | Error symptom | D. Function error                           | Established date | 2013.01.31 | A22 |
|        | Content       | Remote controller operation checking method | Revised date     |            |     |

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②

③

④

| P4002 |          |
|-------|----------|
| 1     | GND      |
| 2     | KEY1     |
| 3     | KEY2     |
| 4     | +3.5V_ST |
| 5     | GND      |
| 6     | LED      |
| 7     | +3.5V_ST |
| 8     | GND      |

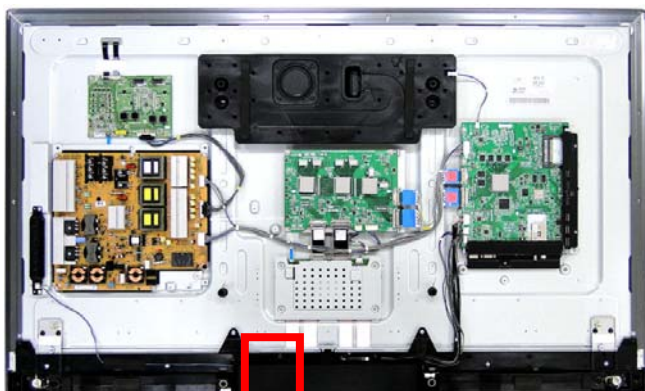
## Checking order

- 1, 2. Check IR cable condition between IR & Main board.
3. Check the st-by 3.5V on the terminal 4,7.
4. When checking the Pre-Amp when the power is in ON condition, it is normal when the Analog Tester needle moves slowly, and defective when it does not move at all.

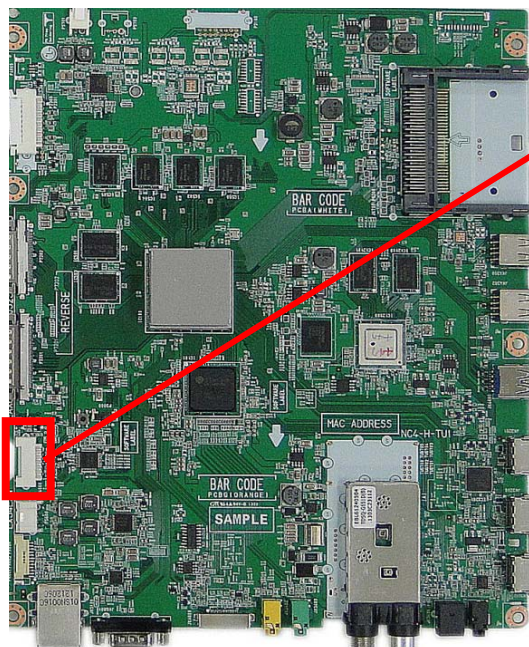
# Standard Repair Process Detail Technical Manual

|        |               |                                         |                  |            |     |
|--------|---------------|-----------------------------------------|------------------|------------|-----|
| LCD TV | Error symptom | D. Function error                       | Established date | 2013.01.31 |     |
|        | Content       | Motion Remote operation checking method | Revised date     |            | A23 |

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①



②

③

| P4000 |                |
|-------|----------------|
| 1     | +3.5V_WOL      |
| 2     | +3.3V          |
| 3     | USB_DM         |
| 4     | RTS            |
| 5     | USB_DP         |
| 6     | RX             |
| 7     | GND            |
| 8     | TX             |
| 9     | WOL            |
| 10    | RESET          |
| 11    | GND            |
| 12    | CTS            |
| 13    | NC             |
| 14    | +3.5V_ST(OLED) |
| 15    | IR(OLED)       |
| 16    | GND            |

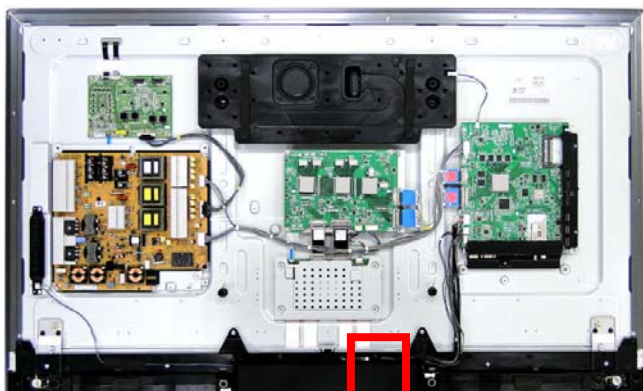
## Checking order

- 1, 2. Check Motion cable condition between Motion assy & Main board.
3. Check the 3.3V on the terminal 2.

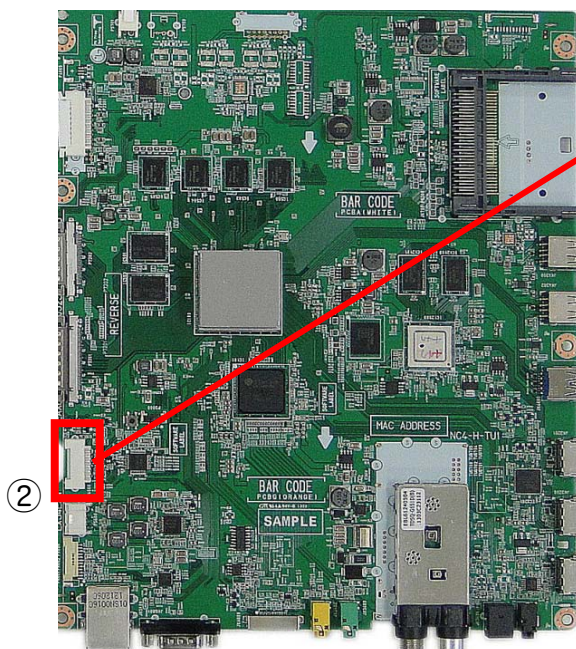
# Standard Repair Process Detail Technical Manual

|        |               |                                |                  |            |     |
|--------|---------------|--------------------------------|------------------|------------|-----|
| LCD TV | Error symptom | D. Function error              | Established date | 2013.01.31 |     |
|        | Content       | Wifi operation checking method | Revised date     |            | A24 |

< XXLA965V-ZA >



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③

| P4000 |                |
|-------|----------------|
| 1     | +3.5V_WOL      |
| 2     | +3.3V          |
| 3     | USB_DM         |
| 4     | RTS            |
| 5     | USB_DP         |
| 6     | RX             |
| 7     | GND            |
| 8     | TX             |
| 9     | WOL            |
| 10    | RESET          |
| 11    | GND            |
| 12    | CTS            |
| 13    | NC             |
| 14    | +3.5V_ST(OLED) |
| 15    | IR(OLED)       |
| 16    | GND            |

## Checking order

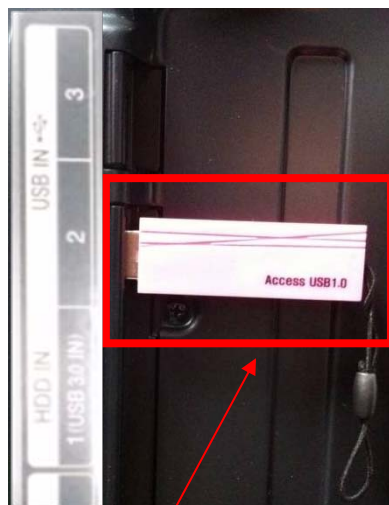
- 1, 2. Check Wifi cable condition between Wifi assy & Main board.
3. Check the 3.3V on the terminal 2.



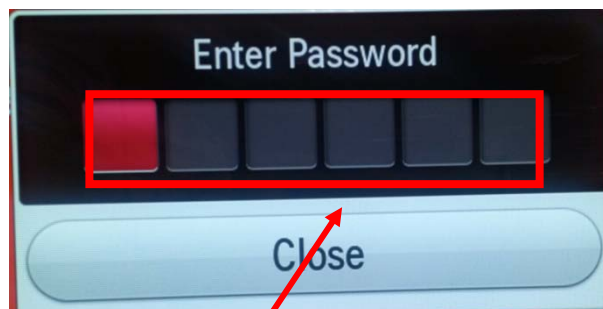
# Standard Repair Process Detail Technical Manual

|        |               |                             |                  |            |     |
|--------|---------------|-----------------------------|------------------|------------|-----|
| LCD TV | Error symptom | E. Etc                      | Established date | 2013.01.31 |     |
|        | Content       | Tool option changing method | Revised date     |            | A26 |

< XXLA965V-ZA >



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②

## Changing method

1. Contact the USB memory. (USB 1,2,3 jack)
2. Enter the password. (ex. 000000)

\* Access USB Memory has each password.

A30